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GLOBAL SPREAD OF CHEMICAL AND BIOLOGICAL WEAPONS

HEARINGS

BEFORE THE

COMMITTEE ON GOVERNMENTAL AFFAIRS

AND ITS

PERMANENT SUBCOMMITTEE ON INVESTIGATIONS
UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

ASSESSING CHALLENGES AND RESPONSES, FEBRUARY 9, 10, 1989

EXPORT CONTROLS OVER CHEMICAL/BIOLOGICAL WEAPON MATERIALS

ORGANIZATIONAL CHALLENGES FOR THE 1990's, MAY 2, 1989 GERM WARS

BIOLOGICAL WEAPONS PROLIFERATION AND THE NEW GENETICS, MAY 17, 1989

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GLOBAL SPREAD OF CHEMICAL AND BIOLOGICAL WEAPONS: ASSESSING CHALLENGES AND RESPONSES

THURSDAY, FEBRUARY 9, 1989

U.S. SENATE,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
AND ITS
PERMANENT SUBCOMMITTEE ON INVESTIGATIONS,
Washington, DC.

The Committee and the Subcommittee met, pursuant to notice, at 9:35 a.m., in room SD-342, Dirksen Senate Office Building, Hon. John Glenn, Chairman of the Committee, presiding.

Present: Senators Glenn, Nunn, Levin, Sasser, Kohl, Lieberman, Roth, Cohen, and Heinz.

OPENING STATEMENT OF CHAIRMAN GLENN

Chairman GLENN. The hearings will be in order.

Today, we begin a series of hearings about stopping the global spread of chemical and biological weapons. We will hear from the Director of Central Intelligence, who has graciously agreed to appear before the Committee to discuss this growing danger; and it is a subject that he once called, "one of the most serious threats to world peace."

Following Judge Webster's remarks, two experts from the U.S. Army will testify on various technical aspects of biological and chemical weapons. We will also receive testimony from two physicians who have had first-hand experience in observing and treating victims of chemical weapons used in the Iran-Iraq war.

We will hear the views of two noted specialists who will address specific problems concerning the global spread of these weapons. Tomorrow, we will discuss various international initiatives, not just to prevent the use of these deadly weapons, but to ban entirely their manufacture or stockpile. We expect a full discussion of the difficult problem of confirming that all nations party to such a treaty will fully abide by it. In other words, back to our key word of verification once again.

In future weeks, we expect to have additional hearings; export controls both here and abroad will surely be a focus of at least one of those hearings.

I must add here my deep appreciation and admiration for the fine work that Senator Nunn and his able staff on the Permanent Subcommittee on Investigations have contributed in their continuing work in this area. I certainly salute his efforts and those of the staff, and am proud to co-chair this special series of hearings with Sam.

We had our staffs both working in the same directions. We combined forces on this, and we are co-chairing this set of hearings. The Governmental Affairs Committee has had a long and continuing interest in stopping the global spread of weapons of mass destruction. In the past, we, of course, have concentrated on nuclear weapons. Today and in future hearings, we will examine the proliferation of chemical and biological weapons, devices which may have a less-devastating effect—but which are far more likely to be used than nuclear weapons.

Over the years, this Committee has heard testimony about the many dangers arising from the possession and spread of various weapons of mass destruction. You go clear back to January of 1976, the first Chairman of the Atomic Energy Commission, David Lilienthal, said before one of our Subcommittees: "If a great number of countries come to have an arsenal of nuclear weapons, then I am glad I am not a young man, and I am sorry for my grandchildren."

The specter of nuclear proliferation is still threatening world peace. Since 1974—when India detonated what it called a "peaceful nuclear explosion"—three, maybe four, additional nations have acquired the means to make nuclear weapons; and others are doing their best to follow suit. We are even hearing some voices suggesting that America should consider abandoning its leadership role in non-proliferation, in exchange for the lesser role of trying to manage the nuclear arming of the world.

Some of these voices say the genie is out of the bottle, and nothing more can be done. Now, in the past, we have faced the prospect of Colonel Qadhafi getting the bomb—the so-called "Islamic Bomb." But I think now we are faced with a new and equally deadly threat.

Let me just give an example. A manufacturing facility maybe only twice the size of this hearing room could turn out very substantial amounts, tons even, of nerve gas or biological agents; very small quantities of which are undetectable, but have the capability to kill hundreds of thousands of people.

One example given to me in my office; was that you could take 1 ounce of some biological material, which could easily be smuggled into the country in just a pocket flask without detection at airports, and combine it with half-a-gallon or so of growth medium for that biological material. When properly grown and disseminated, you could sicken or kill perhaps as much as 95-percent of a population of a city the size of Washington, D.C. Now, that is what we are up against. We are talking about very tiny amounts of material that will do enormous amounts of damage.

How can we expect the CIA or anyone to be able to discover such small facilities, much less detect the very small vials passing through airports or other points of entry to our or any other country?

I think we are at the time when we could have a 1-man sponsored holocaust with this material. I do not think that overstates it.

Then how are we, as a government, organized to defend ourselves against such an eventuality and to prevent the shipment of technology, people or material that would contribute to this problem in other countries? And how do we convince other nations to employ the same stringent protective measures that we apply in our own country?

I do not agree that the world can or should tolerate the proliferation of any weapons of mass destruction, nuclear or otherwise. Many of the problems now arising from the spread of relatively inexpensive chemical and biological weapons and the long-range missiles that would deliver such devices are not new. We have encountered similar problems in our ongoing efforts to stop the spread of the Bomb.

What is new and sadly ironic is that nations may now be engaging in chemical or biological arms races just as the Superpowers are finally starting to reduce their nuclear arsenals.

The challenge before us can be put quite simply. We must learn the lessons history teaches about the virtues of a firm will, the vices of defeatism, and the ever-growing need to solve these global problems through cooperation with other nations.

There are still a few people around who can recall the horrors of chemical warfare during World War I, just as there are those who remember the biological and nuclear warfare used in East Asia during World War II, and some of the experiments that were done there. I wonder what they must think as they read—these people who have witnessed all of these horrors—I wonder what they must think as they read the latest reports of countries working on weapons that are even more deadly.

The clock is ticking, and midnight is fast approaching. We must do more to reduce this global threat.

I will be pleased if, after the conclusion of our last hearing in this series, some groundwork will have been laid; so that we too, like David Lillienthal some 13 years ago, will not pity our grandchildren for the gruesome weapons that we may leave behind.

Since Sam and I are co-chairs this morning, Sam, I will call on you first here as a co-chair.

Senator ROTH. That is fine. I may demand the right to speak twice, as ranking member of both, but——

Senator NUNN. I will be glad to defer, Senator Roth, if you——

Senator ROTH. No, please proceed.

Chairman GLENN. Double-time.

OPENING STATEMENT OF SENATOR NUNN

Senator NUNN. Thank you very much, Senator Glenn. I am delighted to be able to work with you and Senator Roth and the other members of this Committee on this very important subject.

As a result of the joint efforts of the Committee on Government Affairs, and the Permanent Subcommittee on Investigations—I must say Senator Roth is ranking member on both of those; so I guess by all rules, he is entitled to speak twice—we will begin today a series of hearings on the proliferation and use of chemical and biological weapons. While this issue is as timely as today's headlines, it is also unfortunately as ancient as the history of warfare among nations.

Indeed, history records that during the Spartan siege of the city of Platea in 429 B.C., the Spartan troops placed enormous pots of pitch, sulfur and burning charcoal against the city's walls so that the irritating gases from this mixture would reach the city's defenders and do them harm.

2,400 years later, in 1988, Iraqi troops dropped bombs filled with mustard gas and other chemical agents on Kurdish villages. Early Persian, Greek and Roman historians record instances of the use of diseased corpses of men and animals to contaminate wells and other sources of drinking water.

Today we will hear of the new threat posed by the development of biological agents such as anthrax and Q-fever. It appears that in this area, mankind has acquired new technology but not acquired new behavior over the years.

Fortunately, however, for as long as there have been such weapons, there has also been a revulsion against their use. In his 1758 treatise on the law of nations, the eminent Swiss jurist and legal philosopher, de Vattel, citing a dialogue between Julius Caesar and Cicero, wrote the following concerning the use of poison weapons:

> Nations may do themselves justice sword in hand, but shall it be indifferent to human society that they employ odious means, capable of spreading desolation over the whole face of the earth. Thus, whoever by his example contributes by introducing so destructive a custom, declares himself the enemy of mankind and deserves the execration of all ages.

From the time of Julius Caesar to The Hague Conventions of 1899 and 1907, to the Convention of Geneva of 1925, the use of chemical weapons has been decried and attempts have been made to prohibit their introduction into war.

In 1972, the world once again came together to sign the Biological and Toxins Weapons Convention, banning the possession and use of biological weapons.

Sadly, however, in recent years, violations of these conventions have been committed with virtual impunity. Despite the Convention of Geneva, Iraq and Iran each used chemical weapons during the Gulf War. Iraq also used chemical weapons against its own Kurdish minority, which we will hear about in today's testimony. In addition, the number of nations possessing and seeking to possess chemical weapons continues to grow, as we all know.

Despite the 1972 Biological Weapons Convention, numerous nations also continue in efforts to develop offensive biological weapons. This is a state of affairs which the world cannot afford to ignore or to tolerate, as you have made so clear, Senator Glenn.

Today's hearings will examine the proliferation of chemical and biological weapons, with particular emphasis on the spread of such weapons in the Third World. We will also hear from medical experts who have treated victims of chemical weapons attacks. Chemical and biological weapons respect no distinctions between soldiers or civilians, young or old, male or female.

The testimony by these experts on the pain and suffering they have witnessed, especially of young children whose bodies and minds were irreparably scarred, serves as a warning to the world that we must never allow ourselves to ignore the use of chemical or biological weapons against any people, anywhere in the world.

There is some reason for hope, however. In the last few years, the Soviet Union has been more forthcoming on the issue of chemical weapons. They have come a long way toward the United States and Allied positions on verification in the Geneva negotiations. They have announced a destruction program for at least a part of their chemical inventory. And although their numbers have been well below Western estimates, they have begun to release some data on the size of their chemical stockpile.

Moreover, negotiations within the 40-nation Conference on Disarmament resumed just this week, and there appears to be a basis for continuing the progress that has been achieved there in recent years. President Bush has placed the signing of a global treaty banning chemical weapons as the top or one of the top priorities of his Administration in foreign policy. And just last month, 149 nations came together in Paris to reaffirm their commitments not to use chemical weapons and to call for a prohibition on their development, production and stockpiling.

As encouraging as these recent developments are, we must not be lulled into a false sense of security that the problems posed by chemical and biological weapons can be easily solved. Much hard work remains to be done in order to achieve a practicable and effective solution.

As this work continues, policymakers, all of us, Executive and Legislative, must approach these problems fully cognizant of the limitations and drawbacks of proposed solutions, as well as the possibilities of alternate and/or interim measures.

In tomorrow's hearings, we will examine Administration efforts to stem the tide of proliferation, and to negotiate a global ban. The threat posed by the continued proliferation of chemical and biological weapons is real and substantial. The combination of the proliferation of these weapons with the increasing spread of advanced delivery systems, is a grave danger and a challenge to mankind.

We as a Nation must explore all available opportunities to mitigate this danger, and we must coordinate with other nations.

I want to thank you, Senator Glenn, and the staff of the Government Affairs Committee, Senator Roth, and the Minority staff of the Permanent Subcommittee on Investigations for their cooperation and support in connection with this hearing. My special thanks to Alan Edelman and Dave Buckley on my staff, of the PSI Subcommittee, whose investigative work over the last few months has been invaluable.

Thank you, Senator Glenn.

Chairman GLENN. Thank you. Senator Roth.

OPENING STATEMENT OF SENATOR ROTH

Senator ROTH. Thank you, Mr. Chairman. I do applaud the efforts of both my Chairmen, Senator Glenn and Senator Nunn, in holding hearings on this very, very important subject.

I think we can all agree the hour is late in seeking to put in place a program that will end the proliferation, the threat, the use of chemical weapons.

Now it may be that the horror of chemical warfare is a fading image in the American memory. The Western world first witnesses the horror of chemical weapons 75 years ago during World War I; and in those days, delivery of chemical agents amounted to opening

a canister of poisonous gas on the battlefield, and hoping the wind blew in the right direction.

The world's reaction was to sign a treaty in 1925 which banned the use of chemical weapons. That agreement had been adhered to until recent times. Today, ill winds are blowing; cheap but deadly, these so-called poor man's nuclear weapons are spreading throughout the international community like wildfire.

Last month's treaty talks in Paris reflect the world's growing concern with the proliferation of chemical and biological weapons; yet unbelievably, there are certain unscrupulous businesses that continue to profit by indiscriminately marketing these poisons around the globe.

No country is safe when these horrific weapons are allowed to fall into the clutches of international outlaws like Libya's Colonel Qadhafi. And has been pointed out, it is indeed ironic that our progress on nuclear disarmament has actually increased the significance of chemical weapons.

The seriousness of this threat demands the attention of the United States, all nations, large and small. It is imperative that we find a means to ensure chemical and biological weapons are eliminated as a threat to mankind.

I am pleased that we are having the hearings here. I think hopefully, the debate we shall generate will be a healthy one, a necessary one. Can we sufficiently verify compliance with any agreement? Which countries must be signatories to any agreement? What can Congress do? Are the various proposals, such as those that would sanction countries that use chemical weapons, be helpful in assuring compliance. So I look forward to these hearings as a first step in that direction.

Chairman GLENN. Thank you very much.

Senator Sasser, do you have any comments?

OPENING STATEMENT OF SENATOR SASSER

Senator SASSER. Thank you very much, Mr. Chairman. I want to commend you, Mr. Chairman, and Senator Nunn, for convening these hearings here today. The dangerous spread of chemical and biological weapons in the world today, coupled with the brazen disregard some countries have exhibited towards international agreements, I think presents very serious problems.

I noted that Senator Roth indicated or reminded us that chemical weapons were used for the first time about 75 years ago in World War I. I well remember an old professor who I had in college who had been gassed in World War I; and the horrors that he saw there on the Western Front with the use of chemical weapons caused this distinguished gentleman to devote the rest of his life to teaching young people about the horrors of warfare, particularly the horrors of chemical warfare.

There is an old saying that those who don't learn the lessons of history are doomed to repeat them; and somehow I seem to sense that we may be going down that path.

Mr. Chairman, I am shocked and angered when I read statements—arrogant statements, I might say—by officials of the Iraqi government, who question why the international community should have the right to question their use of chemical weapons, even when we see these vivid photographs of men, women and children killed indiscriminately by the use of chemical weapons—chemical weapons that kill every air-breathing mammal in sight, including the livestock of these poor farmers and civilians who have been subjected to the use of these weapons.

So I think it is imperative that we examine and explore the proliferation of these weapons that pose such a horrible danger to all of humankind. We have got to work towards a viable solution, and if we fail to do so, I think we can suffer truly disastrous consequences in the years ahead as these cheap, easily manufactured chemical weapons fall into the hands of unscrupulous leaders; or worse, into the hands of madmen or terrorists.

So I want to express my appreciation to you, Senator Glenn and Senator Nunn, for the leadership and the perception that you have shown in holding these very important hearings.

Thank you.

Chairman GLENN. Thank you, Senator Sasser. Senator Lieberman.

OPENING STATEMENT OF SENATOR LIEBERMAN

Senator LIEBERMAN. Very briefly, it is hard to go over the materials that the staff has so ably prepared for these hearings and not to feel depressed about this reminder of the overriding imperfection of our species—the tendency that we have to find new ways to do damage to ourselves.

It is also hard not to be concerned and a little bit frightened about the potential damage that these weapons could do to people around the world, and more particularly, to people here in the United States, unless we do something to get control.

It is pretty obvious that the lion is out of the cage, and we ought to do something to try to get that lion back in the cage. The facts are clear: nations have the ability to wage chemical and biological warfare, and they are doing so.

The reaction of the world community thus far to the use of chemical weapons is just as troubling. What was the reaction to the murder of as many as 50,000 Kurdish civilians by the Iraqis?

The reaction of the world community was basically nothing—sending a message to those who would employ these weapons that they can do so with relative impunity. And I worry, as I am sure everyone else does as we watch this, that we are crossing another moral threshold, quietly losing our capacity for outrage and action.

In that sense, Mr. Chairman, Senator Nunn, one of the most important results of these hearings may be to focus public attention—certainly of American policymakers—on the threat that chemical and biological warfare represents to us, and on the fact that these deadly methods of war, these inhumane acts, are being carried out only with the support of the industrialized nations, including many of our own allies.

It is clear that treaties—the voluntary agreements of 1925 and 1972—are having no effect; no one is observing them. And I hope that one of the ends of these hearings will be, Mr. Chairman, to consider the wisdom of the United States acting unilaterally to fight chemical and biological weapons, perhaps with the application of sanctions against nations that employ them.

I thank you and Senator Nunn, and your staff, for preparing this hearing, and I look forward to the testimony today.

Chairman GLENN. Thank you. Senator Kohl, do you have any comments?

OPENING STATEMENT OF SENATOR KOHL

Senator KOHL. I, too, want to thank you, Senator Glenn and Senator Nunn, for these hearings. Clearly, when we talk about chemical and biological warfare, we are talking about warfare as serious as nuclear warfare, so that these hearings are as important in many respects as any hearings that we have in Washington, that take place during the year.

I think these hearings deserve more importance in terms of their seriousness. The question in my mind is that, whether or not as a result of these hearings—and after all, hearings do not go on interminably—they come and go, and then they become part of history.

We are talking today about something which is as important as it is, and the question that I ask myself is whether or not these hearings will sufficiently focus the Senate and the American people on the seriousness of the problem that we face. And I hope very much that, as a result of these hearings, something concrete begins to emerge; and that they do not just pass into history as we all go our way and do our separate things.

I will be looking at myself, of course, and at all the others of us who are involved in these hearings to see whether or not, when they are over, something at least begins to germinate that leads us towards some constructive actions, with respect to the seriousness of the problem that we are facing.

So I think that it is really important that we are here, and I hope when they are finished, all of us are satisfied that we have done a lot more than spend some time talking about a very serious problem. I am very pleased to be here.

Chairman GLENN. Thank you, Senator Kohl. Senator Heinz.

OPENING STATEMENT OF SENATOR HEINZ

Senator HEINZ. Mr. Chairman, I would like to commend you for holding these hearings. You know, the civilized world thought, at the end of World War I, it had banned chemical weapons. In that war, some 90,000 people lost their lives; and over 1 million were grievously injured; and in World War II, that did prove to be the case.

But today, as we know with certainty in the case of the Kurds and Iranians who have been gassed by the Iraqis, chemical warfare is back; and we are going to have a very tough time stopping it.

We have witnessed, just in the last few months, the incredibly difficult time that our country has had getting the Federal Republic of Germany to admit there was a problem. It reminds me of the problem we had with Toshiba, where the Japanese government at first turned a blind eye to the sale of critical propeller technology to the Soviet Union, was unwilling at first to take any disciplinary action against Toshiba and Konigsberg; and here we are faced, in the case of Imhausen, for example, and perhaps Siemens, as well, with another Toshiba all over again. Only this time, instead of rendering obsolete billions of dollars worth of Allied technology by selling sophisticated submarine technology to the Soviet Union, merchants of death are posing risks for peaceful and freedom-loving people throughout a vast region of the world.

I do not know which is worse; they are both terrible. And the bottom line is, we simply can no longer afford to allow short-term greed to put everybody else at risk. That is why Senator Dole, Senator Garn, myself and others introduced legislation—which you are familiar with—to in effect put the sale of chemical and biological weapons technology on exactly the same footing as the sale of sophisticated technology.

And that, let me say, is the least we should do. We should also encourage—and Judge Webster, we are delighted you are here—the Bush Administration to take up where the outgoing Administration left off; and that was with a very strong international initiative on chemical and biological weapons. That initiative needs to continue; and we need to bring into the sphere of those negotiations every Third World country, both the potential users as well as the potential sources of technology.

We need to make sure that the Eastern Bloc is fully in that effort; otherwise, the net that we seek to tighten will allow bits and pieces of critical technology—as has happened in the case of Libya—to flow through and create these factories that are fully capably of re-creating, in their own way, another holocaust.

Mr. Chairman, the reason I commend you is that I think there are people in Europe, particularly in Germany, who think our concern about chemical weapons is a 24-hour phenomenon. I think there are people who may have attended the international conference, who felt if they could just get past that conference, international concern would blow over.

The purpose of your hearing, and the effort you are making today, Mr. Chairman, I think is of monumental importance, that it will show people that we do not intend to let this matter just blow over. To do so would be irresponsible; and I think, Mr. Chairman, that all of us feel that responsible peoples and responsible governments the world over share your and this Committee's concern.

Chairman GLENN. Thank you, Senator Heinz.

Our first witness this morning is Judge William Webster, Director of Central Intelligence Agency; and Judge Webster and his colleagues out at CIA have been extremely helpful during this inquiry. We are very pleased to have him testify before us this morning.

It is an open hearing. It is always difficult when Judge Webster comes up here, sometimes, to restrain ourselves and not get into areas that cannot be discussed in an open hearing. But we will let him take care of that.

Judge Webster, we appreciate your being here this morning, and look forward to your testimony.

Senator NUNN. Mr. Chairman, if I could just say one word before Judge Webster testifies. You have made the point, and I think it needs repeating here, that we are pleased to have the CIA head here before us. He cannot answer all of our questions, and I think all of us, when we ask the questions, ought to understand there will be some that he will have to defer for executive session.

So I think there should be understanding by the Committee on that.

TESTIMONY OF WILLIAM H. WEBSTER, DIRECTOR, CENTRAL INTELLIGENCE AGENCY, WASHINGTON, DC

Judge **Webster**. Thank you very much, Chairman Glenn, Chairman Nunn, members of the Committee. I am very honored to appear before you this morning to discuss the very serious problems of the proliferation of chemical and biological weapons. Chemical weapons proliferation is part of the disturbing trend of weapons development in Third World countries.

Currently, we believe that as many as 20 countries may be developing chemical weapons; and we expect this trend to continue despite ongoing multi-lateral efforts to stop their proliferation.

A major question that we are now addressing is what lessons have been learned from the Iran-Iraq war, the first war since World War I that involves sustained use of chemical weapons.

After the first war, the use of chemical weapons was outlawed by the signers of the 1925 Geneva Protocol. During World War II, even during the most desperate battles, both sides refrained from using chemical weapons; weapons that Winston Churchill described as "that hellish poison."

The Iran-Iraq war ended that restraint and set a dangerous precedent for future wars. The intelligence community has evidence that Iraq used chemical weapons against Iran and also against Iraqi Kurds. Iran, too, employed chemical weapons against Iraqi troops.

Chemical weapons are thought to offer a cheap and readily obtainable means of redressing the military balance against more powerful foes. Some see them as the poor man's answer to nuclear weapons. Our President has spoken out strongly against this problem.

Many countries are developing mustard gas, a terrible weapon first used in World War I. It is a favorite chemical agent for several reasons: its relative ease of manufacture; its long life in storage and on the battlefield, and its ability to incapacitate those who are exposed to it.

Some countries are also developing nerve agents. These agents, though more difficult to manufacture, can cause death in minutes by attacking the brain and nervous system. Other nations may use common industrial chemicals such as cyanide and phosgene. Cyanide prevents the blood from carrying oxygen; while phosgene, widely used in making plastics, can destroy the lungs.

Along with the proliferation of chemical weapons, two equally disturbing developments are the proliferation of both biological weapons and ballistic missiles. We are concerned that the moral barrier to biological warfare has been breached. At least 10 countries are working to produce both previously known and futuristic biological weapons.

Biological warfare agents, including toxins, are more potent than the most deadly chemical warfare agents, and provide the broadest area coverage per pound of payload of any weapons system.

The equipment used to produce biological warfare agents is truly dual-use in nature. With currently available technology, biological warfare agents can be produced at such a rate that large stockpiles are no longer necessary. There are no precursor chemicals or equipment that can be used only for the production of biological warfare agents.

Actually, any nation with a modestly developed pharmaceutical industry can produce biological warfare agents if it chooses. Finally, by the year 2000, at least 15 developing countries will be producing their own ballistic missiles.

Ballistic missiles convey important new political and military status to those who acquire them. Many countries where these missiles are being developed are in the Middle East. All of the Third World missile development programs rely on foreign technology to some degree. But much of this critical technology is already diffused throughout the world, is available for other purposes, or can be easily diverted.

There is also extensive sharing of technology among Third World missile countries, and they are increasingly pooling their resources and technical know-how. With the increase of ballistic missiles in the Third World, the intelligence community must be alert to attempts by these nations to arm missiles with chemical or biological warheads.

We will continue to provide U.S. policymakers with timely and accurate information on the capabilities of countries to develop and produce ballistic missiles and chemical and biological weapons.

Let me now direct your attention to the troubled Middle East, the current center of chemical weapons proliferation. The proliferation of chemical weapons affects the prospects for peace and stability in the Middle East. Of particular concern are Iraq, Syria, Iran and Libya, nations that have either used chemical weapons or have been associated with terrorist activities.

Iraq has produced chemical warfare agents since the early 1980's; with Syria and Iran beginning chemical agent and munition production shortly afterward. Libya is nearly ready to begin large-scale production of chemical agents and munitions. Iraq, Syria and Iran are stockpiling a variety of chemical warfare agents for various battlefield missions. Stocks of chemical warfare agents can often be stored for a period of 10 to 20 years.

These same countries are also quietly producing and amassing a variety of munitions that can be used as delivery systems for chemical agents; bombs, artillery shells, artillery rockets and in some cases, battlefield missiles, have been filled with chemical agents.

The chemical weapons programs of Iraq, Iran, Syria and Libya have a number of common traits: all have been given high priority by their governments and have been cloaked in secrecy. The production complexes have been accorded strict security. In many instances, attempts have been made to conceal them as legitimate industrial facilities. Assistance by foreign suppliers has been crucial to their development in all cases. Assistance provided by foreign suppliers, many of whom were fully witting of the intentions of the Middle East countries to produce chemical weapons, has been the key element that has enabled these nations to develop a capability to produce chemical weapons within only a few years. And without this assistance, these Middle East countries would have been unable to produce chemical weapons.

Foreign suppliers have provided the following types of assistance: technical and operations expertise, constructing production facilities, supplying precursor chemicals, supplying production equipment, supplying parts for munitions and training personnel.

I would like now to provide you with some details about the chemical warfare programs of Iraq, Syria, Iran and Libya. The war with Iran prompted Iraq to accelerate its program and develop a chemical warfare capability. Iraq has produced chemical agents and munitions since the early 1980's. The main chemical warfare complex, located some 70 kilometers northwest of Baghdad, near Samarra, and a number of other production facilities have produced several thousand tons of chemical agents.

From the program's inception, firms and individuals from Western Europe were key to the supply of chemical process equipment, chemical precursors, and technical expertise. West Europeans remained at Samarra even after it began operations. But after several years of experience in producing chemical weapons, Iraq's well-established effort now is far less dependent upon foreign assistance.

At Samarra, Baghdad produces the blister agent mustard and the nerve agents tabun and sarin. Several types of weapons, including bomb, and artillery shells and rockets, have been filled with these agents. Iraq first made military use of chemical agents in 1983 and 1984, when it began to use mustard and nerve agents against Iranian forces. Baghdad continued to use chemical agents on numerous occasions during the war. More recently, and subsequent to the cease-fire with Iran, Iraq used lethal and non-lethal chemical agents against Kurdish civilians.

Despite the current cease-fire with Iran, Iraq continues to produce and stockpile chemical weapons. Moreover, it is expanding its chemical weapons capability, and is taking further steps to make its program entirely independent of foreign assistance.

Syria began producing chemical warfare agents and munitions in the mid-1980's, and currently has a chemical warfare production facility. Syria has nerve agents in some weapons systems. Damascus conceals its program; it is quite closely held; and much like its Middle East neighbors, is likely to continue to expand its chemical warfare capability.

Foreign assistance was of critical importance in allowing Syria to develop its chemical warfare capability. West European firms were instrumental in supplying the required precursor chemicals and equipment. Without the provision of these key elements, Damascus would not have been able to produce chemical weapons.

In the mid-1980's, and after numerous Iraqi chemical attacks, Iran began to produce chemical agents and munitions, later using them in retaliation against Iraqi troops. Iran's chemical weapons production facility is located in the vicinity of Tehran.

Iran produces the blister agent mustard, blood agents, and nerve agents and, like Iraq, has filled bombs and artillery with these agents.

Repeated chemical attacks by Iraq against Iranian troops prompted Tehran to seek foreign assistance to quickly establish its own production program. West European and Asian firms responded by providing chemical processing equipment and chemical precursors. Despite the cease-fire with Iraq, Iran is continuing to expand its chemical warfare program.

Libya's resolve to have a chemical warfare production capability is about to be achieved. A large complex in a remote area about 80 kilometers southwest of Tripoli, near Rabta, has been constructed for this purpose. When this site is fully operational, it may be the single largest chemical warfare agent production plant in the Third World. Because Iraq has a number of production sites, however, its total production capacity will continue to exceed Libya's.

Libya's chemical agent plant is expected to soon begin large scale production of mustard and nerve agents—potentially tens of tons per day. The plant has already had at least one serious toxic chemical spill and such problems are likely to continue.

An adjacent metal fabrication facility is equipped with the precision materials to manufacture components for a variety of bombs and artillery. Other facilities are involved with filling and storing chemical weapons.

It would have been virtually impossible for Libya to harness the technologies necessary to build and operate such a facility without the assistance of foreign countries and personnel from several West European and Asian countries. Assistance by West German companies and individuals has been extensive at the CW production plant. Japanese firms have aided in constructing the metal fabrication area. Many other Western European suppliers have also been involved over the past several years in the construction and supply of materials for the entire complex.

Libya's ability to sustain large-scale chemical warfare production will, in large measure, depend on continued foreign assistance. Over time, Tripoli will grow less dependent on foreign technical expertise, but for the foreseeable future, will remain dependent on foreign suppliers to provide chemical precursors and equipment.

Assessing the proliferation of chemical weapons is one of the most difficult intelligent challenges we now face.

Because much of the equipment needed to produce chemical warfare agents can also be used to produce legitimate industrial chemicals, any pharmaceutical or pesticide plant can be converted to produce these agents. A nation with even a modest chemical industry could use its facilities for part-time production of chemical warfare agents.

Libyan leader Qadhafi, in a speech delivered in October, claimed that the facility at Rabta is intended to produce pharmaceuticals—not chemical warfare agents—and he proposed opening the complex for international inspection. But within fewer than 24 hours, it would be relatively easy for the Libyans to make the site appear to be a pharmaceutical facility. All traces of chemical weapons production could be removed in that amount of time.

The primary purpose of this site, however, is clearly chemical warfare production. The specialized equipment, building design, and security there far exceed the requirements of a commercial plant.

Mr. Chairman, this concludes my opening remarks on the proliferation of chemical and biological weapons. I want to assure you that the intelligence community keeps the Administration, as well as the Intelligence Committees of the Senate and the House, fully informed of developments in this area.

I am now prepared to answer all the questions that I can answer in a public forum, and I appreciate the caveats that both Chairmen gave at the beginning of this hearing.

Chairman GLENN. Thank you very much; I appreciate your excellent remarks; and I would like to limit the questioning to 5 minutes per Senator, at least on the first round—since we have several people here and acknowledging the co-chair nature of our hearings this morning—I would like to call on Senator Nunn to lead off the questions this morning, and then I will fit my questions in after Senator Roth.

Senator NUNN. Thank you very much, Mr. Chairman. Judge Webster, thank you for your testimony. I appreciate you being here.

You made reference several times, in talking about the development of Syrian chemical facilities—Iran, Iraq, Libya—to foreign suppliers—and the essential task that they perform that otherwise probably would not have been able to be performed by the country in question. What about U.S. firms? Have United States firms been involved in any of this type of activity, in facilitating the building of these chemical facilities?

Judge WEBSTER. Well, from time to time, we have received intelligence that may indicate that some of the materials could have originated with U.S. firms. We continue to investigate the possibility that they were witting participants; but at the present time I am not able to say that any U.S. firms were witting suppliers or aiders and abettors in this effort.

Senator NUNN. What about the laws in our country? Do you think our laws effectively preclude that or at least make that kind of behavior a violation—are our laws tight enough?

Judge WEBSTER. Probably not, Senator.

Senator NUNN. Would it be a clear violation of our law for an American company to do what we have pointed the finger at West German companies for doing, in regard to Libya?

Judge WEBSTER. It is my understanding, Mr. Chairman, that sanctions have been imposed against all of those countries for supplying any of the types of precursor chemicals and equipment. So it would be clear violations of law.

Senator NUNN. You mentioned the possible terrorist use of these weapons, or the fact that some countries have affiliation with terrorist activities—how alarmed, on a scale of 1 to 10, are you about the possible access of terrorists to chemical and biological weapons—10 being the gravest danger?

Judge WEBSTER. I am not sure that my use of that scale is any better than anybody else's.

Senator NUNN. Or whatever you would like to have.

Judge WEBSTER. If you ask me how alarmed I am about present indications, I would put it lower on the scale. But the ability to produce and/or acquire this kind of weapon is such that in the process of proliferation, I would put it very high on the scale.

Senator NUNN. So it is potential use that you fear——

Judge WEBSTER. That is correct.

Senator NUNN [continuing]. Rather than present capability?

Judge WEBSTER. That is correct.

Senator NUNN. How long would it take? It is not a very long transition period from a country that might cooperate with terrorists to the actual employment; is there?

Judge WEBSTER. Not very; and we use other types of weapons as an example of acquisitions by terrorists. The more of this that is stockpiled, I think the more likely that terrorists can find the means to acquire it.

Senator NUNN. Judge Webster, we will have testimony—I believe tomorrow—from some witnesses that have studied this whole question of verification in some detail, and will, I believe, offer the view that no matter what our intentions, and no matter what a treaty says in the chemical area, that we are not going to be able to verify. Do you have any general observations about the verifiability of a possible chemical weapons treaty?

Judge WEBSTER. Well, as I indicated before, verification in this area is one of the most difficult things that we could be asked to do. It is so easy to disguise a facility that it would require a very substantial amount of confidence-building effort among participating nations. Inspections do not answer the whole question, because they are easily converted and activities easily and quickly concealed.

Discussions, negotiations, on the diplomatic front can and will help; and ought to be ongoing and not as Senator Heinz said—a 24-hour attention span. It is going to be very difficult for us, but we are working to improve our ability to detect the violations of commitments of this kind.

I cannot promise any more than I can promise in the arms-control area, total verification potential. But it is more difficult than arms-control verification.

Senator NUNN. More difficult in the chemical area than it is in arms-control?

Judge WEBSTER. Yes.

Senator NUNN. Thank you, Judge Webster. Thank you, Mr. Chairman.

Chairman GLENN. Thank you. Senator Roth.

Senator ROTH. Thank you, Mr. Chairman. I would like to go back for a moment to the question of the role of suppliers. You make a very strong statement that it would not have been possible for a number of these Third World countries to develop these facilities if there had not been the assistance provided by foreign suppliers.

Now, it is my understanding that you are not in a position to name firms in public; but let me ask you this policy question—you also talk about the loss of the moral barrier. Somewhere down the road, would it not be wise to name names for those who are deliberately, wittingly, helping create these kind of facilities?

Judge WEBSTER. I can see very strong arguments in that direction, Senator Roth; and certainly that is one means of approaching the moral suasion. Our problem with it, in asking the intelligence community to supply those names, is that much of the information that is currently being developed is quite sensitive and could be readily attributed to a limited number of discrete sources that we have been able to develop; and we do not want that kind of activity to compromise our ability to continue to supply information—accurate information—to the policymakers.

There is a tendency—a sort of slippery slope tendency—that once you make the statement and you make the accusation, more proof is called for; and then people who have been entrusted with the information are sometimes not as discrete as they must be in this case, if we are going to keep a hold of the means of knowledge that we currently have.

Senator ROTH. Well, I understand and appreciate those concerns, as they are legitimate. I think there is the other side of the slope, too, that the information—sometimes I fear that we are so secretive about the information we secure that we are unable to utilize it where it would be useful. And I am concerned about how we develop this moral persuasion again—not to use chemical weapons—and one means, it seems to me—or at least one factor—would be to expose those companies that supply them.

Let me ask you a second question in the same area. Senator Nunn touched on it with respect to American firms. In trying to develop a treaty or international agreement, would it be desirable in this area to try to somehow make it a crime in the various countries, as part of that agreement, for individuals and firms to assist in the creation of these kind of facilities—chemical or biological warfare facilities?

Judge WEBSTER. You are asking me to address a policy issue. I don't know that making a crime would make it any easier or more difficult for us to develop information about it; and you have—there are variations in the extent of current criminal laws in various countries. And some countries plead their inability to take after private entrepreneurs who are engaged in this activity because of the insufficiency of their laws.

Certainly common approaches throughout particularly the free world ought to improve law enforcement capability in this area.

Senator ROTH. Do we have, in trying to eliminate this threat, several problems—is the problem of using chemical warfare in war entirely separate from the problem of terrorist activity? Is it easier, for example, to deal with the question of chemical warfare versus terrorism, because war requires a stockpile in large quantities? Is there any difference? Is terrorism a more difficult problem to deal with?

Judge WEBSTER. If I understand your question, I do not think you can make meaningful distinctions. Terrorism is a by-product potential; use in warfare is now something we have experienced in recent times in the Middle East. And that is a very present problem, the fact that it has been used.

It is one thing to produce it; it is another to use it.

Senator ROTH. Well, is terrorism a by-product—I mean, can a small group of people get together and try to develop some kind of chemical warfare for their terrorist activity, distinct from the government?

Judge WEBSTER. They could and it is potentially possible. I think the more likely approach would be to find the means to acquire the chemical weapons from existing stockpiles.

Senator ROTH. Thank you, Mr. Chairman.

Chairman **Glenn**. Thank you very much. In developing nuclear weapons of mass destruction, any nation needs a good scientific base, a big base, an industrial plan, an infrastructure that is quite extensive.

You indicate that Libya has the capability of producing tens of tons per day——

Judge **Webster**. That is right.

Chairman **Glenn** [continuing]. Of this, from the plant there in Libya. Could you give us an idea—and we will probably have some testimony on this from some of the other witnesses later—but can you give us an idea of the amounts that are needed to go into effective use as an attack agent?

For instance, mustard gas—you have to have certain concentrations, which are more than some types of nerve gases. Can you give us an idea of the volumes that would be useful to a terrorist if he was planning an attack on something in this country, to follow up on Senator Roth's question.

Judge **Webster**. I am a little afraid I am getting close to areas where I ought to supply this information in Executive Session, because I may wander into areas that are—in trying to respond to your question—that I should not.

If I could use the example of biological warfare, very small quantities appropriately placed in, say, the ventilating system of a major defense facility, could cause incalculable harm. But in warfare, the ability to disperse that chemical over broad battlefield areas of cities is such that they would require substantially more of the chemical, even though its lethality is such that it only requires a small amount to kill thousands of people.

Chairman **Glenn**. I was told that one-half ounce smuggled in and properly grown—in the proper growth medium—and then disseminated in an aerosol would be enough to sicken or kill 95-percent of the population of Washington, D.C. Is that the order of magnitude of things that we are talking about?

Judge **Webster**. I think that that is inside the range of discussion; but before we frighten ourselves with that, I think it is important to realize that wind conditions, weather, all the other factors that play make it unlikely that anyone would succeed with that quantity at the present time.

Chairman **Glenn**. What I am getting back to, though, is this—you talked about the Libyan situation, their plant there being the largest one, I believe, that we have seen.

Judge **Webster**. Largest single plant.

Chairman **Glenn**. Largest single plant. For the nerve agents, those that would be the small amounts, could be used for terrorists and so on. What is the smallest plant that you think could be usable? A space the size of this room—twice the size of this room—would be a credible size to put together a nerve agent factory?

Judge **Webster**. This is large enough to produce. A small factory is probably about as far as I should go in being specific about it. The process is not that involved.

Chairman **Glenn**. That is the other thing. The technology is not that closely held. As I understand it, any good college chemistry student could have available to him or her the formulas; it is a matter then of just getting the equipment and the precursors to put it together. Is that correct?

Judge **Webster**. Well, that is true in the same sense that you can go to the public library and learn how to build a nuclear bomb. But in terms of building it safely, and not having it go off in your face—and I am talking about chemical warfare now—we do experience—the Libyans have had trouble with their facility. They need experts to warn them about what not to do, and how to do it. They need certain kinds of equipment for handling liquids that might otherwise become unsafe to the users.

And there are substantial risks. Some of those risks are not taken as seriously in some parts of the world as they are in other places, so they are willing to assume those risks.

Chairman **Glenn**. When you refer in your testimony, as you did repeatedly, to CW and BW "capability"—does that mean that they just have the technical know-how or does it mean we have observed production, or does it include stockpiling, weaponization, or capability just means that we think they are smart enough to do it?

Judge **Webster**. If you are talking about those that are developing the capability in the numbers that I gave you, some are at a point where they have stockpiled. Others are still in the research stage.

Chairman **Glenn**. And you said 20 countries may be developing chemical weapons. Does that mean we have to assume they have them?

Judge **Webster**. I think you should assume that they have them—at least 20 countries.

Chairman **Glenn**. My time is just about up. The yellow light is on; so I will pass along under our Early-Bird rule of who was here at the gavel. Senator Sasser.

Senator **Sasser**. Thank you, Mr. Chairman. Mr. Director, I read in the popular press that the Soviet Union is indicating that they are going to unilaterally destroy a portion of their chemical weapons. Does the Soviet Union share our concern about the proliferation of chemical weapons and, more specifically, the use of chemical weapons in warfare?

Judge **Webster**. I believe that the Soviet Union does share our concerns. In many respects, this is a small nation's response; and the Soviets have the same legitimate concerns that we do in Superpower context. And in fact, we are having conversations over a periodic basis with the Soviets on what can be done to reduce this type of proliferation in the world.

I think we can applaud the announcement of chemical warfare capability, but I think we should also realize that we do this on a regular basis ourselves. And there has not been a real exposition of whether they are destroying outmoded, unsafe or unstable chemicals that they have had over time, or whether this is an effort to really reduce their ability to engage in chemical warfare.

Senator **Sasser**. Do you have any information that you could share with us this morning in Open Session as to whether or not they are destroying old, obsolete chemical weapons, or are they destroying more up-to-date chemical weapons?

Judge **Webster**. I don't believe that the statements that have been made or the information that we have would answer your question, Senator. There have been far more specific statements made with respect to other forms of arms reduction than have been made with respect to chemical warfare. That is not to say that more statements will not be forthcoming; but I cannot answer your question on the basis of present information.

Senator **Sasser**. Well, the reason I bring up the question of the Soviet Union, Mr. Director, is that it is our fellow Superpower in the world; and the Soviet Union is a principal arms supplier to Syria, Iraq and Libya, if I am not mistaken, which are the three countries in the Middle East which you have indicated here this morning have developed or are developing a chemical warfare capability.

What would be the prospects of the Soviets operating in concert with us to try to repress or stop the manufacture of chemical weapons in these client states of theirs—at least client states with regard to the purchase of military hardware?

Judge **Webster**. Well, in the area of cooperation, I think that this is not a subject that ought to be limited to the free world. It is a subject in which all the great powers should be participating; and I would hope those discussions will bear that kind of fruit.

Senator **Sasser**. This is an elementary question, but why do companies continue to supply materials to the chemical warfare programs of these Third World countries in spite of laws of their own nations banning the sale of the technology or the machinery, or the apparatus, or the reagents that are needed to manufacture these chemical warfare?

Judge **Webster**. Some, of course, are unwitting of the ultimate destination of the products they supply. Others are not. In the latter case, I can only surmise that greed is the explanation.

Senator **Sasser**. Well, you have indicated before in your testimony that many of these nations are developing a chemical warfare capability—I think you said as sort of a poor man's way of getting into the nuclear club, or is the equivalent of getting into the nuclear club.

Is there any evidence that these nations, other than Iraq, which really broke the moral ban against the use of chemical weapons; and the argument can be made that Iran—certainly no friend of the United States—used their weapons only in retaliation—is there any evidence that these nations are prepared to use these weapons now to supply terrorists or in any other way other than to protect themselves defensively?

What can you tell us about that?

Judge **Webster**. I think that there is no current evidence that any of these nations are encouraging the use of chemical agents by terrorist groups that they have supported presently or in the past. But there is an ambivalence, particularly in the Middle East, about the use of chemical weapons. They have difficulty understanding our sense of outrage and horror at its use. It is efficient; it is cheap; it is another weapon of destruction. And many over there see it as a way of balancing what they conceive as a nuclear presence in the Middle East that they can counter by having a chemical warfare capability.

Senator **Sasser**. My time has expired. Thank you, Mr. Director.

Chairman **Glenn**. Senator Lieberman.

Senator LIEBERMAN. Thank you, Mr. Chairman. Judge Webster, I would like to pick up on the line of questioning that Senator Sasser has just pursued, particularly about the extent of Soviet involvement in chemical and biological warfare.

My first question is, how would you assess the role of the Soviet Union in the proliferation of chemical and biological weapons? Have they been active suppliers to some of the Soviet client states around the world, who they normally supply other weapons to?

Judge WEBSTER. I would like to respond in generalizations, and I can do anything more that is required in executive session.

Senator LIEBERMAN. Fine.

Judge WEBSTER. I do not believe, in recent times—and I am simply not possessed of the facts in earlier history, when the Soviets were more actively interested in some of the Middle East terrorist activities—I do not believe that there is evidence to say that the Soviets are supporting proliferation of chemical warfare.

As I indicated earlier, their interests are identical to ours in stopping this kind of proliferation. They have continued to develop their own capabilities; and they are one of the countries that continue to pursue biological warfare capability. But I do not believe that you can associate them with significant efforts in the Middle East to develop chemical capabilities.

Senator LIEBERMAN. How would you then describe, to the extent that you are able here, the Soviet policy on chemical and biological weapons as an instrument of war, particularly in light of the statement you have just made that they are continuing to pursue the development of biological weapons?

Judge WEBSTER. I believe the Soviets consider, as we do, that the proliferation of chemical warfare capability in underdeveloped countries is de-stabilizing to peace in those regions; and for that reason would look for reasonable ways to reduce it while not giving up any of their equities and ties in the Middle East.

Senator LIEBERMAN. My focus in this question is on Soviet development and employment of chemical and biological weapons themselves. I take it that they consider them a part of their defense policy structure.

Judge WEBSTER. That is correct. That does not mean that they propose to use them.

Senator LIEBERMAN. Correct. But to the best of our knowledge, the Soviet Union is continuing the research and development of both chemical and biological weapons.

Judge WEBSTER. That is correct.

Senator LIEBERMAN. Again, to the extent that you are able to answer here, how would you describe America's policy toward chemical and biological weapons; that is, our own development and use of those weapons?

Judge WEBSTER. Well, in general, our policy is to be able to defend against a chemical warfare attack, and to do all that is necessary to equip our soldiers and civilians to protect themselves against this kind of assault; and research certainly is active in that area.

It is my understanding, and I have not heard the current Administration enunciate a policy, but I understand our past policies have been to understand and have a chemical warfare capability, which does not include biological warfare capability.

Senator LIEBERMAN. So that our government is pursuing two lines. One, as I hear you, is to develop some capacity to defend against the effects of chemical and biological weapons. Is that correct?

Judge WEBSTER. That is correct.

Senator LIEBERMAN. That is, the impact on our citizens of such an attack.

Judge WEBSTER. That is correct.

Senator LIEBERMAN. And then second, our government continues to possess chemical and biological weapons for the deterrent effect that they might have on potential aggressor nations?

Judge WEBSTER. Not biological weapons.

Senator LIEBERMAN. I am sorry. I appreciate that. It is only chemical weapons.

One further question on a different line, if I may; again, to the extent that you are able. It seems to me that one of the causes for alarm here, particularly in strategic areas of the world, such as the Middle East, is not only the proliferation of chemical and biological weapons, but the development of new means of delivering them, particularly ground-to-ground missiles.

Could you assess the extent to which some of those countries in the Middle East have developed not only CBW capacity but ground-to-ground missile capacity, and the extent to which that alters the strategic balance within the Middle East?

Judge WEBSTER. All of the countries in the Middle East that we think of, that I have mentioned earlier, and some additional ones whom I think I should not name in this hearing have developed short-range and intermediate-range ballistic missiles. Those missiles can be adapted to the delivery of chemical warheads.

The best way I can say it in the shortest number of words is the effect is it puts every important city in the Middle East at risk—within range of potential enemy assault by missile delivery systems.

Senator LIEBERMAN. Thank you.

Chairman GLENN. Senator Kohl.

Senator KOHL. Well, I think there is no doubt about what we are talking about here this morning, in terms of its seriousness to the world. And I am curious about your reaction to this thought, that here we are, the United States, and we have the most sophisticated nuclear and chemical sorts of weapons and defenses; and I have not heard us suggest that we are willing yet to give up—and I do not think you can talk about one without talking about the other in terms of the arsenal.

I think other countries throughout the world would make the same argument, that one is the equivalent of another. And how do we exercise leadership when we are in such a position of having these weapons in their most sophisticated way; and even in working on defenses against these weapons—how are we going to go out and do what needs to be done to protect ourselves and the world against chemical and biological warfare?

Judge WEBSTER. Well, Senator, you are addressing what is essentially a policy question to me. Looking at it as best I can through the intelligence windows, I think it is important for discussions and negotiations to continue. Those that have been—that the Paris Conference should be kept alive; other countries concerned about this issue should continue to explore ways to reduce the threat of chemical warfare.

The linking of nuclear capability with chemical warfare, in my view, is too big a bite to swallow, and assures defeat in discussion about chemical warfare. The distinction that can be made—although I must say, when you are talking about weapons of death and destruction, it is often difficult to make distinctions—is that nuclear war capability has not been employed since the two events in Japan at the end of the War. And that separates it in discussion from chemical warfare, which has come into use and therefore required more serious efforts to control both its production and its use.

And with that, from an intelligence perspective, ways to verify what other countries that have that capability are, in fact, doing, and what, in fact, their capability is.

Senator KOHL. Is there any reasons that you could tell us that the United States and the Soviet Union, in our own mutual self-interest, could not be working hand-in-hand on this problem throughout the world?

Judge WEBSTER. I know of no reason why we cannot make that effort; and I see signs that there is mutual interest in doing it. It requires the usual amount of caution. We perceive each other as potential adversaries in the field; and so we have to approach this problem carefully. But I think we are having discussions; and as our confidence in other negotiations—such as the INF Treaty and its implementation grow—our ability to work together for the reduction of the chemical warfare threat should increase.

Senator KOHL. Thank you, Mr. Webster.

Chairman GLENN. Thank you. Senator Cohen.

Senator COHEN. Thank you, Mr. Chairman. I would like to respond to just a couple of observations that have been made this morning.

Judge Webster, it is fair to say the United States, back in 1969, stopped the production of chemical weapons on a unilateral basis. Notwithstanding that gesture by Richard Nixon, the Soviet Union continued to produce chemical weapons in extraordinary amounts. And while the disparity between the U.S. stockpiles and those in the possession of the Soviet Union are classified, it is fair to say they are fairly dramatic.

And only after the United States expressed an interest in developing the binary chemicals, as opposed to the unitary chemicals, did the Soviet Union then express any serious intent to negotiate seriously about chemical weapons reduction and elimination. And I would join with those who have suggested that perhaps we should call upon the Soviet Union to exert their influence in dealing with client states; not only in chemical and biological weapons, but I would say in other weapons used by terrorists, such as Semtex.

They might, for example, call upon Czechoslovakia, one of the major producers of Semtex, to stop producing that chemical compound and distributing it to nations who engage in terrorist activities, including the bombing of Pan Am 103. So I think there is a lot there that we can do to call upon them to start reducing the supply of technology and training to those states that engage in terrorist activities.

Third point. Mr. Webster, you indicated that just because the Soviet Union has chemical weapons does not mean they intend to use them. I would take some issue with you on that particular point. I think that studies have shown that the Soviet war-fighting strategy deeply integrates chemical weapons capability and use.

Another point I would make is that your statement that the Soviets have possession of biological weapons would, in fact, place them in violation of the law today. There is a treaty that prohibits the possession of biological weapons. So I assume by your statement and other public statements by U.S. government officials that the Soviets are in possession of biological weapons, that would place them in violation of the law as it stands today.

Now, just a couple of questions after those observations.

Judge WEBSTER. Senator, I would have to go back and see exactly what I said. What I intended to say was that they are engaging in the development of biological warfare capability.

Senator COHEN. Well, I think we have already had testimony from General Burns that indicates that they do possess biological weapons; and I believe that includes the notion that since they possess them, they have the means to produce them. And the production of them would be in violation of the treaty.

Let me go back to the notion of strengthening export controls. You indicated on page 7 that the foreign assistance to Middle East countries producing chemical weapons takes various forms: technical and operations expertise; constructing production facilities; supplying production equipment; training personnel; supplying precursor chemicals and supplying parts for munitions.

The United States has export restrictions on only the last two; that is, the precursor chemicals and the parts for munitions. Do you think it would be in our interest to try and expand our export controls over the other elements that would be inherent in the construction of chemical weapons capabilities?

Judge WEBSTER. I do, acknowledging, of course, that proof of violations may be more difficult in those areas.

Senator COHEN. Well, it seems to me that we have a responsibility to try and deal with prohibiting the export of technical expertise, of construction capabilities and so forth. My time is going to run out, so I will come back when I have a chance.

Judge WEBSTER. We are in agreement. I am not disputing that.

Senator COHEN. Well, in 1985, the President's Chemical Warfare Review Commission proposed that we should impose penalties on Western companies that are engaged in chemical weapon proliferation. Both the Reagan Administration and Congress failed to act on this recommendation. Recently, however, this proposal was revived in the form of a bill, S. 8. This legislation would deny for 2 years access to the United States market to foreign companies that engage in proliferation. Domestic companies would face criminal and administrative penalties.

Does the intelligence community favor this legislation?

Judge Webster. That is a policy question, Senator; and I do not think the new Administration has had a chance to speak out on it. I prefer not to——

Senator Cohen. Let me rephrase it. Do you think that the proliferation we have seen over the past few years would have been more difficult had we had legislation such as this on the books?

Judge Webster. Yes.

Senator Cohen. Final point. There was a conference in Paris last month. Some 149 nations met to discuss the issues of chemical weapon proliferation. We had hoped that there would be a general condemnation on chemical weapon proliferation at that conference. But during the conference, many nations expressed the view that several of my colleagues have raised here—what is so inherently evil about the possession of chemical weapons over that of, let us say, nuclear weapons?

We came away with the conclusion—and I must say that most of us have seen the dance of diplomacy in many drafts of communiques and none is more evident, I think, of what I would call linguistic pas de deux than the text of the declaration from that Paris Conference. We came away with a conclusion that, indeed, this declaration is a reaffirmation of the condemnation of the proliferation of chemical weapons. Other nations read that document and came to an opposite conclusion.

India, for example, indicated that it would dispute our interpretation of that provision. And moreover, there was a tremendous hesitancy at that conference to name names of those who were engaged in proliferation of chemical weapons.

In your judgment, does this conference and this declaration serve to discourage further chemical weapons proliferation, or simply encourage the view that the international community is impotent to act against it?

Judge Webster. Well, it remains to be seen how the reaction is; but I think that it was an encouraging conference. I do not regard it as a failure. I think, from what we can see, from what intelligence we are able to pick up, it had an impact. The question is, was it a 24-hour impact, or is it one that is going to be carried forward?

Senator Cohen. Thank you, Mr. Chairman. My time is up.

Chairman Glenn. Senator Levin.

Senator Levin. Thank you, Mr. Chairman; just a few questions. I think you made reference in your testimony to inadequacies in our law relative to trafficking in chemical weapons and materials, or components of those weapons.

Can you specify the inadequacies?

Judge Webster. Well, I want to tell you that I don't consider myself an expert in this, and have not attempted to participate in devising these laws that are in the—in my review of the bills that are in the hopper. Existing bills do create problems in terms of whether they are subject to sanctions or whether they cover the indirect trans-shipment of precursors—same kind of problem we have with technology transfers. It is legitimate to—some of these chemicals are entirely legitimate and, as I refer to them earlier in my statement, dual-purpose.

Senator LEVIN. Would you supply for our record the inadequacies which you and your staff see in existing laws, so we would have that?

Judge WEBSTER. I will be glad to respond on the record.

[The material referred to follows:]

The adequacy of existing laws concerning trafficking in chemical weapons and materials is a matter that is being closely examined by the Administration. The Agency has been working with the State Department, the Arms Control and Disarmament Agency and the Department of Commerce on this issue, and we support the Administration position, which we understand has been conveyed to the Committee.

I believe that legislation authorizing the President to impose sanctions on countries that use chemical or biological weapons in violation of international law, or companies which contribute to CBW proliferation, would address an inadequacy in existing law and would be an important step in efforts to deter the proliferation and use of CBW. It is very important, however, that such sanctions should not be retroactive and should allow the President the flexibility to determine when and how to impose them. I also believe we need to strengthen our multilateral efforts to control the illegal use of CBW and I would support legislation providing the President discretion to pursue such multilateral efforts. I understand that the Administration is currently working with relevant committees of Congress to draft implementing legislation.

I would be opposed to legislation that mandates the use of sanctions. I have serious concerns that mandatory sanctions could jeopardize our intelligence sources used to collect information on CBW because the imposition of sanctions would disclose the fact that we are aware that a particular country or company is involved in CBW production. The disclosure of that fact could in some instances lead to the disclosure of the source that we are relying upon to provide the U.S. Government with the CBW information. The President should be allowed to take into account the effect on our ability to gather CBW information before imposing sanctions. I would also oppose sanctions which could inadvertently interfere with certain intelligence activities that have been reported to the intelligence committees.

I am also concerned about the requirement contained in certain CBW bills that would mandate detailed reports to Congress on companies or countries involved in the production or use of CBW. Some of the information that would be contained in those reports is derived from sensitive intelligence sources. I believe that the portion of the mandated report involving sensitive intelligence information should be delivered to the intelligence committees for handling under their rules concerning classified information.

Senator LEVIN. Both Iran and Iraq are signatories to the 1925 Geneva Protocol; but both have been found by the U.N. to have used chemical weapons during their war. Do you know whether there are any sanctions that could be imposed, pursuant to that protocol?

Judge WEBSTER. My understanding is the United States has unilaterally imposed sanctions.

Senator LEVIN. Have we urged the U.N. to take sanctions against Iraq or Iran?

Judge WEBSTER. Have we or should we?

Senator LEVIN. Have we?

Judge WEBSTER. I just cannot answer that question. I understand another witness from State Department will be here, and I am sure he can supply it.

Senator LEVIN. Just one last question, because I know we have promised to keep you on schedule. You say the new Administration has not yet taken a position on the bills that have been introduced which would place sanctions on firms that traffic in these materials, both foreign firms and domestic.

The question from Senator Cohen is whether or not the intelligence community has taken a position on the bills; and you indicated that the new Administration has not. Could you answer the question, without saying what your position is—could you indicate whether you have taken a position? I will not ask you what it is.

Judge WEBSTER. I think the answer is no. The answer is no.

Senator LEVIN. And then, do you plan on taking a position relative to these bills, and again, I will not ask you what that position will be if you are not free to share that with us until you have shared it with the Bush Administration. But do you plan on taking a position relative to these bills, which would impose sanctions on foreign and domestic firms that export these materials?

Judge WEBSTER. Senator, what we plan to do is to supply, through the National Security Council, our best intelligence estimates on what the impact and consequences of those bills will be. For instance, we are looking very closely at the provisions that protect our sources and our methods. Each of those bills have reporting requirements in them. We are very much concerned that our ability to protect our means of knowing what is going on is not put at risk by in-artfully worded reporting requirements.

Senator COHEN. Thank you.

Chairman GLENN. I do want just another couple of questions here. We will have another fast round if we can. Time is getting away from us; but a couple of questions, and we will make this second round just as fast as we can.

In the nuclear weapons field, it is very difficult to verify what they have and do not have; and that is the big industrial complexes and so on, to make nuclear weapons. Do we have the detection, the analytical means or other means, to verify a ban if we wanted to enforce a ban?

Judge WEBSTER. I would not be happy with what we currently have. We utilize every form of intelligence collection that we have to zero in on these plants. We depend heavily upon human intelligence, upon signals intelligence and overhead imagery, to pull together a case of whether a particular plant is or is not engaged in chemical warfare rather than legitimate production.

And there are thousands of plants around the world that could be converted into chemical warfare-producing plants.

Chairman GLENN. I do not know whether you want to answer this next question in Open Session or not; but how much do you believe there are agreements with existing facilities now to supply weapons for terrorist use? Can you comment on that in Open Session?

Judge WEBSTER. I think we have little, if any, intelligence in that direction. What continues to concern me is, for example, in the Libyan facility at Rabta, the plant production capability far, far exceeds anything that Libya could reasonably be expected to use for its own military purposes, and therefore becomes a potential brokering agent for other countries, which may or may not include terrorist activity.

Chairman GLENN. Are we seeing a desire to get the capability to be one of a deterrent, like we have had a standoff with the Soviet Union with regard to nuclear weapons all these years. They now see this as their big stick in their own relationship; is there any credibility to the fact that if one nation gets it, we should not necessarily discourage their neighbor from getting it. That takes a defeatist attitude going in, but do you think that is a valid theory?

Judge WEBSTER. Well, I do not think we have seen much sign of it as being a deterrent, vis-a-vis the use of chemical warfare against each other. They will use it. Where the strategic importance of it is seen in the Middle East is a deterrent against nuclear capability.

Senator LIEBERMAN. Mr. Chairman, just one brief line of questioning. Judge Webster, you testified about the Libyan facility at Rabta. Do I understand correctly that that facility is, to the best of our knowledge, not on-line at this time?

Judge WEBSTER. It is very close to being on-line. It has produced chemicals; it has had problems in production. They have had to shut down; then, of course, the inspection period—Qadhafi's invitation to come and inspect caused them to disperse a good deal of their equipment and chemicals. It is not in full production, but it has produced.

Senator LIEBERMAN. I inferred from your testimony that the Libyans are still relying on technical assistance from Western countries to bring that facility on-line; is that correct?

Judge WEBSTER. That certainly has been true; but with the passage of time and the experience in working with the product, the need for foreign assistance will go down.

Senator LIEBERMAN. My question is, in that spectrum, where are we now? In other words, have we reached the point where it is too late for us to try to put pressure on our Western allies to stop supplying technical assistance to the Libyan facility at Rabta?

Judge WEBSTER. No, I do not think we are too late. I do not think they have the expertise to operate it without major risk. And they were, until very recently, still calling for assistance.

Senator LIEBERMAN. This may go beyond what you are able to say, but I would like to ask anyway. To the best of your knowledge, is our government pursuing through diplomatic discussions with our allies, particularly the West Germans, the hope and the demand that they will cut off such technical assistance?

Judge WEBSTER. Absolutely.

Senator LIEBERMAN. Thank you.

Chairman GLENN. Senator Kohl, do you have any other questions?

Senator KOHL. Mr. Webster, you have indicated that one of the most difficult intelligence challenges we face is assessing the proliferation of chemical weapons. Consistent with the need to protect sources and methods, I wonder if you could give us an idea of the lee-time we have in terms of knowing with any degree of certainty that a given facility is being used or being developed for chemical weapons production?

Judge WEBSTER. Well, as I indicated earlier, Senator, there are thousands of facilities around the world that can be converted or adapted to one form or another of production of chemical weapons. If I understand your question by lee-time, you mean how long before we recognize that it is a plant?

Senator KOHL. Well, when we do recognize, is it, in fact—in many cases—too late to do anything about it? I mean, in that it is there; and now we know it is there, but it is there.

Judge WEBSTER. When we say too late to do anything about it, I——

Senator KOHL. Even to be aware of it, for that matter.

Judge **Webster**. Well, to answer your question, I will have to go into too much detail about how we find out about these. But as I indicated earlier, human intelligence plays a large role in this—our ability to find through various sources that something is going on in this area—and then our ability to search for and detect it.

Normal means of visual observation are not likely to identify instantly a chemical weapons facility, or even the fact that one is being converted into a chemical weapons facility. Other forms of intelligence, signals intelligence and human intelligence, must necessarily play a role. So I cannot go much beyond that, other than to give you some sense of the difficult that we have in providing total verification. We cannot even come close to that.

Once we can zero in, we have a much better chance.

Senator **Kohl**. One other quick question. With respect to the toxic chemical spills that occur, can you tell us if there have been similar incidents at other plants except the Libyan plant, and can you tell us what the consequences of the Libyan spill might be?

Judge **Webster**. I am inclined to think I am right on the edge, and ask your indulgence and answer that in Executive Session, if you wish.

Senator **Kohl**. Thank you.

Judge **Webster**. But there have been, I can say—other countries experimenting have had problems; and there have been incidents in other countries.

Chairman **Glenn**. Judge, thank you very much. We appreciate your being here this morning. We did not quite make the 11 o'clock objective that we were shooting for with you here. I know you have other commitments. And so, I appreciate your patience with us this morning. We appreciate you being here.

Thank you very much.

Judge **Webster**. Thank you, Mr. Chairman.

Chairman **Glenn**. Our next witness is Mr. David Goldberg, Chemical Weapons Analyst, Department of the Army; and Dr. Barry Erlick, Biological Weapons Analyst, Department of the Army.

Gentlemen, welcome. Mr. Goldberg, we welcome your testimony or an abridged version thereof. In any event, the entire statement will be included in the record.

TESTIMONY OF DAVID GOLDBERG, CHEMICAL WEAPONS ANALYST, DEPARTMENT OF THE ARMY [1]

Mr. **Goldberg**. Thank you, sir. Good morning, Senator Glenn, Senator Nunn and members of the Committee. Thank you for the opportunity to appear before you to testify on the subject of chemical warfare. First I will present some basic information, to include descriptions of the more common chemical warfare agents and their effects on humans. I will then provide a brief history of the uses of chemical agents in war.

I would like to begin with a definition of what chemical warfare agent is. It is defined by the United States Department of Defense as a chemical substance which is intended for use in military operations to kill, seriously injure or incapacitate man through its physiological effects. Excluded from consideration are riot control agents, herbicides, smoke and flame.

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[1] See p. 221 for Mr. Goldberg's prepared statement.

Chemical warfare agents can be categorized according to their physiological action. Agents have been given different kinds of names; some are referred to by their actual chemical names while others are given a name having no relationship to chemistry. Many agents have been assigned one or two code letters such as those used by the United States.

Blister, or vesicant agents, damage cells of the skin and mucous membranes. This leads to burns and blisters of the skin, damage to the upper respiratory tract and lungs, and damage to the eyes. Blister agents are generally thought to be delayed action, casualty-producing agents, such as the various mustard agents. But others can be more rapid-acting.

Exposure to enough agent can lead to death due to respiratory complications or infection. Examples of these are sulphur mustard, the nitrogen mustards, lewisite and phosgene oxime.

Choking agents irritate the respiratory tract and eyes. High concentrations of choking agents can cause severe damage of lung tissue which leads to pulmonary edema, accumulation of fluid in the lungs and eventually death due to a lack of oxygen. These agents range from immediate to delayed action. Phosgene is an example of these agents.

Blood agents affect body functions by interfering with the utilization of oxygen at the cellular level, which leads to damage to body tissues and death. Blood agents are rapid acting. Examples are cyanogen chloride, which also irritates the lungs and eyes, and hydrogen cyanide.

Nerve agents cause the improper transmission of nerve impulses by inhibiting the neural enzyme acetylcholinesterase. This results in difficult breathing, disruption of bodily function, and involuntary movements. These symptoms are followed by cessation of breathing and death. Nerve agents act very rapidly. Examples of the "G" series of agents, tabun, sarin and soman, and the V-agents such as VX.

Incapacitating agents disrupt the higher regulatory activity of the brain and produce physiological and/or mental effects that can last for hours or days after exposure and render individuals incapable of concerted efforts. They are not designed to cause injury, and casualties will recover without treatment.

Although riot control agents are not defined as being chemical warfare agents by the United States, I will address them here because they have been used in warfare, and they have been mistaken for the more toxic CW agents. A riot control agent, as distinguished from a chemical warfare agent, is defined as a chemical that produces temporary irritating or disabling effects when in contact with the eyes or when inhaled. Riot control agents are of two types: tear-producing and vomiting compounds. It should be noted that riot control agents can cause more serious illness or death if used in confined spaces.

Tear agents cause the flow of tears and irritation of the upper respiratory tract and skin. High concentrations can cause nausea and vomiting. Some tear agents can also produce symptoms associated with choking agents and vomiting compounds; examples are agents with the codes CN and CS.

Vomiting agents lead to great discomfort by causing, in progressive order, irritation of the eyes and mucous membranes, coughing, severe headache, pain and tightness in the chest, and nausea and vomiting. An example is adamsite. Historically, mankind has used one form or another of chemical warfare since warfare began. Military use of irritating smoke and poisonous fumes have been reported as far back as the Peloponnesian War and the Roman Empire.

However, it was not until World War I that chemical science and military technology had advanced so that chemical agent use could produce significant results. During World War I, chemical agents were used on all fronts. The first chemical battle of World War I occurred at Ypres, France, on April 22, 1915. In that battle, the Germans used 180 tons of chlorine, dispensed from 5,730 canisters. This attack produced thousands of casualties and a 6-kilometer gap in the Allied line. This attack was the beginning of many chemical agent attacks initiated by both sides. Available industrial chemicals were used at first, but were followed by chemicals developed for use in war. Agents used included choking, vomiting, blood and blister types. During the war, chemical agents were used as fast as they could be manufactured.

Data show that 124,000 tons of toxic agents were used during the War. For the countries engaging in chemical warfare, this use resulted in 1.3 million casualties, or 4.6 percent of the total number of casualties. 91,000 of these chemical casualties died. Of the 1.3 million chemical casualties, Germany, France and the British Empire had approximately 200,000 each, Russia 475,000, and the United States 72,000. These numbers, expressed as percentages, are as follows: 3.5 percent for Germany and France, 7.3 for the British Empire, 7.5 for Russia and 26.8 for the United States.

The higher percentage of U.S. chemical casualties is for the year 1918—is indicative that by that year CW technology and the doctrine for their employment had been fully developed. Similar percentages are found for other combatants for that year.

One result of the wide scale use of chemical agents in World War I was a reaction that led to the 1925 Geneva Protocol for the prohibition of the use in war of asphyxiating, poisonous or other gases, and bacteriological methods of warfare. This international agreement, to which 118 countries are party, prohibits the use of chemical weapons, but not their production or stockpiling.

The Protocol is, in effect, a no first-use agreement, because many of the parties signed with the reservation that the Protocol was not binding if chemical agents were used by an enemy or its allies. Some reservations also made the Protocol non-binding in the case of countries that are not a party to the Protocol.

Despite the existence of the Geneva Protocol, there have been confirmed or alleged chemical agent attacks in 19 different countries in Europe, Asia, Africa and the Middle East since World War I. The more widely known include use in Ethiopia and Yemen. The chemical agents used in these attacks were of the types developed during World War I.

The most recent use of chemical agents has been in the Iran-Iraq war. United Nations reports indicate that blister, nerve and possibly choking and blood agents have been used. The first confirmed use of nerve agents, which were developed in World War II and post-World War II time frames, occurred in this war. Riot control agents were also used.

On the easel are a series of photographs provided to the Permanent Subcommittee on Investigations by an international press organization. These photos show both Kurdish and Iranian victims of chemical weapons attacks.[1]

As you can see from the photos, they vividly illustrate many of the types of physical effects we have been describing, as well as the fact that chemical weapons kill indiscriminately civilians as well as military, women as well as men, and the very young as well as the very old.

Chairman GLENN. Turn those around while you are continuing your testimony there. Just show those, one after the other, sir, as you can.

Go ahead and continue with your testimony. They are rather gruesome pictures, but I think they are very impressive.

Turn them around a little more so everyone can see there.

Thank you. Just go ahead with your testimony.

Mr. GOLDBERG. Chemical agents have been used when a perceived military advantage could be gained. Although chemical agents have never been the primary means of victory, they have added to military power and have had a significant effect on the outcome of certain battles. In the future, other countries are likely to use chemical agents; because not only are they effective, but they are also relatively inexpensive and easy to acquire.

I thank you for your attention. I will now be glad to answer any questions within the bounds that have been set forth in terms of security.

Chairman GLENN. Fine. Dr. Erlick, do you want to make your statement now, and then we will get to our questions for both of you?

TESTIMONY OF BARRY J. ERLICK, Ph.D, BIOLOGICAL WEAPONS ANALYST, DEPARTMENT OF THE ARMY[2]

Dr. ERLICK. Sure. Thank you, Senator Glenn, Senator Nunn, members of the Governmental Affairs Committee and members of the Permanent Subcommittee on Investigations. I am pleased to appear before you to discuss the problem of the proliferation of biological and toxin weapons.

In November of 1969, President Nixon unilaterally renounced the U.S. offensive biological warfare program and three months later, similarly, renounced toxins as a method of warfare.

The establishment of the Biological and Toxin Weapons Convention of 1972, which prohibits the development, production and stockpiling of biological and toxin weapons, was assisted by this initiative. Commonly referred to as the Biological Weapons Convention or the BWC, this agreement was ratified in 1975 by numerous countries. Currently, more than 100 countries, including most

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[1] See Exhibit 13 on p. 651.

[2] See p. 237 for Dr. Erlick's prepared statement.

Middle East countries, are signatories. A major weakness of the BWC is the absence of verification provisions.

The list of traditional warfare agents covered under the BWC is long. However, the most commonly referred to infectious agents include the causative agents of anthrax, cholera, plague, Q fever, tularemia, and viral encephalomyelitides. The toxin agents include, blue-green algal toxins, botulinum toxins, enterotoxins, ricin, saxitoxin, and tetrodotoxin. Attachment A lists some important properties of four of these agents. *Bacillus anthracis* or anthrax bacteria is almost 100 percent fatal when one is exposed by aerosol to approximately 8,000 spores; and death will likely occur in less than 7 days. *Francisella tularensis,* a bacteria that causes tularemia, known as rabbit fever, is highly infectious. Less than 10 organisms can cause disease with symptoms occurring in only 3 to 5 days. As many as 30 percent to 60 percent of those affected will die within 30 days, if not treated. The effects of saxitoxin, a shellfish toxin, are extremely rapid for a toxin. Within as little as 12 minutes, this toxin can cause difficulty in breathing and paralysis. There is no known prophylaxis or therapy and it is estimated that the amount needed to cause death in 50 percent of those exposed is as low as 50 one-millionths of a gram, which represents a potency 1,000 times greater than the chemical nerve agent VX.

The extremely potent botulinal toxins——

Chairman GLENN. What is that one now? What is it you are talking about now?

Dr. ERLICK. This one, sir, that I am speaking about right now?

Chairman GLENN. Yes.

Dr. ERLICK. This is saxitoxin, shellfish toxin. And this is not as great as some that I will mention in a moment, as far as its effect. It is going to get worse.

Chairman GLENN. You mean it gets worse?

Dr. ERLICK. Yes, sir.

What we are looking at is only 1,000 times as potent—when we get into the extremely potent botulinum toxins, which cause death by food poisoning following ingestion of this toxin—you have gastrointestinal symptoms and paralysis which occurs in 1 to 3 days, with a lethality rate as high as 60 percent. Aerosol exposure can at least be as deadly. The amount needed to cause death in 50 percent of those exposed can be as low as 5 one-millionths of a gram; and this represents a potency 10,000 times greater than VX.

Industrial fermentation usually is concerned with products of a microorganism such as antibiotics or other biologicals. Toxins may be produced in the same manner. Alternatively, the organism itself can be the desired end-product. Attachment B illustrates a scheme by which large quantities of biological and toxin agents can be produced by the fermentation process. Bacteria have the ability to multiply very quickly as illustrated by the number pyramid. The heavy concentration of bacteria produced in a fermenter or bioreactor is apparent. The fermentation process, starting with a small seed culture and ending with a product such as anthrax bacteria, can be as short as 96 hours. New computerized systems are producing greater yields and higher quality products than in the past, and genetic engineering is changing the types of products generated. Additionally, some toxins can now be produced by synthetic means.

The ultimate purpose of material and equipment used for the development and production of biological and toxin agents is extremely difficult to determine. The possibility of concealing the development and production under a "dual use" cover poses significant problems in the detection of a foreign biological and toxin warfare program. Any nation can readily and legally obtain most of the essential production materials on the open market. Furthermore, very potent agents can be obtained from natural sources, such as infected wild animals, soil or spoiled food. Initially, the material, techniques, and the very organisms or toxins, are the same whether one is producing a vaccine or warfare agent. The ultimate objective, be it vaccine or weapon, depends on the intent of the user. Most production facilities utilizing microorganisms, including pharmaceutical plants and even breweries, can be converted to produce biological or toxin agents in a matter of hours, with modest prior provision.

The proliferation of chemical warfare weapons, as observed in the Middle East, has been followed by a similar proliferation of biological and toxin weapons, which represent a cheaper and less sophisticated alternative to chemical or nuclear weapons. The number of nations having or suspected of having offensive biological and toxin warfare programs has increased from 4 to 10 since 1972. Some of these nations are unfriendly to the U.S.; some are located in the Middle East; and some are signatories to the BWC. For the most part, these countries have selected the classical, well-known agents.

Thank you for your attention. I would be pleased to try to answer any questions you may have.

Chairman GLENN. Thank you very much. Let me follow up on that a little bit. You say, like in tularemia, as few as 10 organisms needed. What do you define as an organism? Is it a microbe or a molecule or——

Dr. ERLICK. That is correct. A microbe itself is the organism. And it can then replicate—two, four, et cetera—by geometrical progression.

Chairman GLENN. And can you relate that to—is that an ounce or is it——

Dr. ERLICK. You could not even see it, sir. 8,000 spores that I mentioned with anthrax would barely—not even be visible—on the tip of my finger. And that is 8,000. So we are talking about something that is the size of what we call a micron, or 1-millionth of a meter in size.

Chairman GLENN. Are we producing any biological weapons in this country now?

Dr. ERLICK. No, sir. Not at all.

Chairman GLENN. It is against the law, as I understand it. Is that correct?

Dr. ERLICK. Absolutely.

Senator NUNN. Senator Glenn, may I ask one question there?

Chairman GLENN. Sure.

Senator NUNN. You made the point that there is very little difference between the agent and the vaccine. When you answered that question, does that take that into account?

Dr. ERLICK. Yes, it does. Absolutely. There is a significant distinction once you go—the initial organism that you begin with when you are dealing with a vaccine or agent is usually the same. That is the principal organism. But then, with the vaccine, you—what we call—attenuate it, or you create a—attenuated is alive, but not a pathogenic organism. That is what a vaccine is; or you can actually kill it with formaldehyde. And that is a killed vaccine. And we have those in our bodies.

If one wishes to go on to produce weapons, you do not go through that process. And what you actually do is accentuate the negative properties, pathogenicity, so to speak; and then you start to deviate into a whole weapons development program. And there is a significant distinction.

Chairman GLENN. Mr. Goldberg, would you compare for us the difficulties of producing chemical weapons as opposed to biological? Is this substantially different, or is the process basically the same?

Mr. GOLDBERG. No, the process is quite different, sir, in terms of the—of course, the fact that chemicals, of course, are not live organisms. And you need substantially different types of equipment. For example, you might—for the production of nerve agents—need specialized types of equipment such as platinum or gold-lined vessels, for example, because of the corrosive nature of some of the chemicals that you are dealing with.

Some of the technologies are more sophisticated; perhaps some of the materials are more sophisticated.

Chairman GLENN. So when we talk about the ease and the small plants and all of the things that we see burgeoning all over the world right now, as Director Webster indicated to us—those are mainly in the CW area, not as much in the biological warfare area; is that correct?

Mr. GOLDBERG. That is correct, sir.

Chairman GLENN. What are our defenses against the biological?

Dr. ERLICK. Well, sir, that gets me into an area that I do not necessarily cover, because we assess foreign capabilities. But in essence, we are maintaining an effort to acquire adequate defenses, and these defenses deal with—in the medical area and also in the physical protection area.

Chairman GLENN. Once these things start in the environment, what kills them off—anything? You had in your testimony here a chart that showed the rapid growth.[1]

Dr. ERLICK. Yes.

Chairman GLENN. Grows as a square on a continuing basis every second—I think your chart had, I believe——

Dr. ERLICK. Very rapidly, yes sir.

Chairman GLENN. Very rapidly. Now, what will stop that growth?

Dr. ERLICK. The good part is that in nature the elements themselves—sunlight, for instance, ultraviolet radiation—will inactivate even spoliated anthrax.

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[1] See p. 241.

As you recall, the British had problems of Gruinard Island back in the 1940's and later on trying to decontaminate it, but exposed to the sunlight these organisms will be destroyed.

So, most of these organisms are quite labile in nature and are not persistent.

Chairman GLENN. Would you agree that the formulas for most of the CW materials that we are concerned about now are very common in literature and in, basically, college chemistry books? Is that correct?

Mr. GOLDBERG. That is correct, Senator Glenn. You can go to any first year organic chemistry book and at least get the basic chemistry for the production of many of these agents.

Chairman GLENN. Just on nerve gas, now. Let us take that for just a second.

What kind of a vial or size or amount of material would be needed to, say, put in the Astrodome and maybe kill thousands of people all at one time. Would that be something that could be carried in a pocket flask and would be undetectable coming through airport detectors?

Mr. GOLDBERG. I think the size of the Astrodome pretty much depends on, I guess—if the conditions are constant—I would say it would not take very much. It would not be very difficult at all to smuggle in enough nerve agent inside something like the Astrodome where it is confined, and you have a constant temperature and pressure to do considerable amount of damage, yes, sir.

Chairman GLENN. But are we talking about gallons, or are we talking about nerve gas and toxins that can be carried—not toxins, but nerve gas, the best type that it can be made by small factories—could that be something that could be small enough that it could be carried on one person's body?

Mr. GOLDBERG. I do not believe one person—it is possible, sir. It depends on how they get it in. But it is possible, but I do not believe that one person could get enough nerve agent in to kill everyone or most people in something the size of the Astrodome.

Chairman GLENN. Thank you. My time is up.

Mr. GOLDBERG. But certainly, it could be made in a relatively small laboratory.

Chairman GLENN. Senator Nunn?

Senator NUNN. Mr. Goldberg, in the field of technology chemical weapon proliferation, what do you see coming in the future compared to what we have now in terms of technology?

Mr. GOLDBERG. In terms of new nations acquiring a more sophisticated technology, sir?

Senator NUNN. Well, and also whether we are going to see a quantum jump in the lethality and danger of chemical weapons. Are we going to have technological breakthroughs of, maybe the Doctor could answer this, in chemical weapons that make our present problem pale in comparison to what may be here in 10 years?

Mr. GOLDBERG. We may have reached about the limit of toxicity of chemical agents. Certainly with the development of the V-agents, which are very, very toxic, we may in fact be very close to the theoretical limit of toxicity of chemical agents. There may be some work going on that I am not aware of because, along with Dr.

Erlick, my responsibilities are primarily with the foreign countries, sir. I am unaware of any other work along that line.

Senator NUNN. What are the technical difficulties we face in controlling the export of chemical weapons in terms of precursor chemicals?

Mr. GOLDBERG. It is a very difficult problem, and I would say, for example, I could use the production of some of the nerve agents to illustrate that.

If you are going to produce something on the order of, let us say, sarin or soman, for example, a nerve agent. Some of the chemicals that are used are embargoed. But if you go back far enough to the basic chemicals, for example phosphorus and chlorine, you can make the basic starting chemical of PCL–3, and then you can use that starting chemical to make the nerve agents themselves.

Many of the other chemicals that are required for the production of nerve agents, some of the alcohols, for example, are relatively easy to acquire, are ubiquitous throughout the chemical industry and simply cannot be embargoed.

Senator NUNN. So, the basic elements can be very hard to control, although the derivatives from those elements can be more readily controlled here?

Mr. GOLDBERG. That is correct, sir. The basic chemicals are difficult to control. You can make it more difficult for a country and more expensive for a country to acquire chemical weapons, but ultimately it would be extremely difficult if they really had the will and were willing to put enough money and time and effort to prevent them from acquiring a chemical capability by trying to embargo basic chemicals.

Senator NUNN. So, export control can be successful to a point. But for a determined country that is absolutely committed to acquiring the capability, it would be very difficult to prevent that, if not impossible.

Mr. GOLDBERG. I would say it will be very difficult to prevent that, yes, sir.

Senator NUNN. How do you compare chemical to biological weapons as far as suitability for use in warfare based on the present technology?

Mr. GOLDBERG. I can only speak for chemical weapons. I am not a biological weapons expert, or warfare expert.

But I can say that I think that chemical weapons have shown, indeed, to be quite useful, particularly against populaces or an enemy that is not particularly well-prepared, does not have good defenses, does not have good treatment, and good protective equipment. I certainly believe that they were a factor in the current peace talks, or at least the cease-fire in the Iran-Iraq war.

Chairman GLENN. Dr. Erlick, you want to take a crack at that question?

Dr. ERLICK. Sure. In terms of biological agent, we used to think of infectious agents, biological agents as being more strategic broad area coverage, because you have an incubation period, which is variable.

But, with new capabilities in the area of biotechnology we do see some more control over these agents so they can be somewhat more predictable, and that includes areas outside biotechnology dealing with the environment and looking at atmospheric scientists.

But I think that it is important to point out the toxins which are extremely similar to chemical agents, are very effective, potentially, and we do see them as being effective in the tactical battlefield as well as effective in the strategic sense, and they have many advantages.

Senator NUNN. Let me ask both of you this question in both chemical and biological, and that is how likely is it that the country producing these weapons, of the group producing these weapons, whether biological or chemical, would end up at considerable risk themselves because of the danger of being exposed to those weapons?

In other words, what is the danger here of a backfire effect on those producing the weapons? First chemical and then biological.

Mr. GOLDBERG. To a large extent, that would depend on the sophistication of the country that is attempting to produce them.

Certainly, the controls, the equipment, the types of filters, the hoods, air treatments that are necessary, is well defined and well known.

If the country were relatively backward and attempted to develop them indigenously, the potential is certainly there for some kind of catastrophic accident. Should they acquire this technology from elsewhere and the expertise to help them build the plant, then the potential is probably much less.

Dr. ERLICK. I would generally agree, and point to the accident that the Soviets had in Sverdlovsk in 1979 where anthrax was released inadvertently, and they suffered many deaths. So the danger is there.

Senator NUNN. And the more we deny them help, third-world countries that may be in the process of chemical or biological, the more that risk is raised. And when I say "we" I mean the western industrial world.

Mr. GOLDBERG. I would say that that is quite true, yes, sir.

Dr. ERLICK. I would just point out that with biological, it is extremely difficult to deny help in terms of technology and material because it mimics almost exactly a pharmaceutical industry or some medically related of commercial facility.

Senator NUNN. Thank you, Mr. Chairman.

Chairman GLENN. Thank both of our witnesses. Mr. Lieberman?

Senator LIEBERMAN. Thank you, Mr. Chairman.

Dr. Erlick, Judge Webster in his testimony this morning suggested that one thing that may inhibit some nations from getting into chemical and biological warfares is the prospect of accident I believe I just heard you refer to the incident in Russia in 1979, which was an outbreak of anthrax.

Dr. ERLICK. That is correct.

Senator LIEBERMAN. Is it your best judgment that that resulted from an accident in a biological weapons production facility?

Dr. ERLICK. Yes, it is. It is the assessment of the intelligence community.

Senator LIEBERMAN. Right. Can you just describe for us first, the nature of the accident—specifically, whether there was an explosion—and second, what the impact was on the civilian population?

Dr. ERLICK. What happened, basically, in 1979, April, they did have, we believe, an explosion approximately ten pounds of anthrax was released. The cloud did travel some distance and they suffered an undetermined amount of deaths, but the point is it was a significant number, and that initially, many of these deaths were due to pulmonary anthrax, so they died very quickly and very gruesomely.

This facility was identified as a biological warfare facility, and it was difficult in terms of their controlling the accident because they had to spray, subsequent to the accident, and treat the people medically.

So, it was a significant problem. We can sort of call it a biological Chernobyl.

Senator LIEBERMAN. Yes. Do I understand that the Soviets still deny that it was an explosion?

Dr. ERLICK. Yes, they do. We have had several reiterations from the Soviets.

Senator LIEBERMAN. Right, but our conclusion was that it clearly was an explosion of the facility.

Dr. ERLICK. Yes, it is.

Senator LIEBERMAN. And that would clearly mean that there was a violation of the 1972 international accords.

Dr. ERLICK. Yes, that would be.

Senator LIEBERMAN. Let me ask you this. How might biological weapons be delivered in a conflict? In other words, I can imagine a missile-to-missile delivery, for instance, of gases or other chemical weapons. How are biological weapons delivered?

Dr. ERLICK. In an extremely similar fashion, as a matter of fact, you can, of course, use many of the standard munitions that would be used for chemical agent delivery. You can use spray tanks from aircraft-mounted, truck-mounted—could be very effective. We could look at just an agricultural spraying capability as having that potential.

Senator LIEBERMAN. It is really as simple as that?

Dr. ERLICK. Absolutely.

Senator LIEBERMAN. Just imagine a small plane, such as those that spray farm fields in this country, spraying biological weapons.

Dr. ERLICK. It could be effective, but of course, in a military scenario, they would have to be more sophisticated.

Senator LIEBERMAN. Right. Are there other more discreet means of delivery? I mean, you might imagine agents dropping biological toxins into a water supply, or something of that kind.

Dr. ERLICK. Yes, I think that some people have, of course, had some misconceptions in terms of the amount of agent necessary for a water supply, or to cause problems. It would take an absolutely enormous amount of even botulinum toxins that I mentioned in a New York water supply to cause any problems, you would need virtually trainloads of toxin because of the tremendous dilution of it.

But, if you look at, for instance, water supplies in buildings, or even air-conditioner systems, as we saw, nature provided us an incident in 1976 at the Bellevue-Stratford Hotel, with Legionnaires disease, or legionella pneumophila. And the people were exposed to an aerosol coming from the bacteria in the air-conditioning systems, and many deaths occurred.

So, if you are talking large-scale, it is unlikely. Small-scale, it could be possible.

Senator **Lieberman**. Which certainly would, if I can use these terms, raise the attractiveness of this form of attack to, terrorists——

Dr. **Erlick**. I suspect so.

Senator **Lieberman**. Yes. Let me ask you this question.

Based on your technical understanding of these weapons and the capacity of foreign countries to produce and deliver them, can either of you envision an adequate verification procedure as a part of an international attempt to ban development of these weapons?

Mr. **Goldberg**. Well, as Judge Webster has so eloquently stated, it is very difficult to verify or to monitor, if you want to use the intelligence term, to monitor a chemical treaty. The difficulty in locating a particular facility, perhaps it would be camouflaged or concealed, perhaps it would be buried within a larger chemical combine that they produce other more benign civilian chemicals.

Very difficult, and as he said, depends to a large extent on very good sources of intelligence of all types to put a picture together, and it cannot be done instantaneously.

Senator **Lieberman**. Dr. Erlick, is it the same for biological weapons?

Dr. **Erlick**. I would agree, but even with a greater level difficulty because of the dual use potential.

Senator **Lieberman**. Thank you.

Chairman **Glenn**. Senator Kohl.

Senator **Kohl**. Question to either one of you. In terms of the Soviet biological accident, has there been any action by the international community to sanction the Soviets for that accident?

Dr. **Erlick**. The United States has brought this issue to the United Nations and we have at least registered our opinion, but I cannot speak anymore in terms of what the response has been.

Senator **Lieberman**. I would like to ask you as representatives of the military if you can see moral difference between chemical weapons and other weapons systems that we use?

We have, for example, bombs that kill and maim and that can be dropped on civilians and cause all kinds of enormous damage simply by accident. There has never been the kind of horror with respect to bombs that there are attached to the use of chemical weapons.

Is there any kind of military view in terms of the morality of these agents of destruction as opposed to other weapons of war?

Mr. **Goldberg**. I think it's—I personally, and if you are asking—I do not have a personal opinion of this. You are asking something personal.

I think the official position is that this is a weapon of war. It is, of course, one that we have never used in modern times and do not intend to use. Our doctrine is very clear on that point, and we would only use it in retaliation for it being used on us. We are quite clear about that. Our programs primarily have been built up with the aim towards achieving some kind of a verifiable agreement to ban these weapons, and I think the kind of movement we are getting, for example, from the Soviet Union in the chemical weapons talks, pretty clear indication that that policy has been successful.

Dr. ERLICK. In terms of biological, I would say that our feelings were made quite clear in 1969 on our unilateral renouncement of this capability, and that includes toxins. And I do not think there has been any change in our policy.

Senator KOHL. Thank you, Mr. Chairman.

Chairman GLENN. Thank you. I would like to follow up on that. I may have missed a comment. I had to step out for just a moment. But I want to follow up.

Mr. Erlick, you say in your testimony the only difference between the materials, the organisms, and so forth, for vaccine or for weapons developments depends upon the intent of the user.

Dr. ERLICK. Yes sir; starting material.

Chairman GLENN. We say we do not have, we do not have a BW capability, but yet we are developing the vaccines.

Dr. ERLICK. Correct.

Chairman GLENN. Now, does this mean that because we proclaim that we only have defensive intent that we are still stockpiling these things that could be used if we needed in an offensive manner——

Dr. ERLICK. Not at all.

Chairman GLENN. Or is it just a matter of having a delivery system?

Dr. ERLICK. No, we actually do not produce sufficient quantities. Also, the—and I am speaking about our defensive program which we really do not assess, of course—but I will say that it is a completely open program in terms of medical defense, and there are no secrets. The production of a vaccine, although the starting material before you make it into a vaccine is the same as an agent, the process is very much different when you carry it on to weaponization.

And we do not have the capability, nor the intent to actually carry this past just producing limited amounts of agents for a vaccine. You need very little agents for vaccine, and it does not look like a weaponization program at all.

Chairman GLENN. Okay, I was just looking at it from the other side.

You say in your testimony the possibility of concealing the development and production under a dual use cover, poses significant problems in the detection of a foreign biological and toxin warfare program.

Looking at it from the Soviet side, how do they know we do not have some other program? We have problems determining whether other people have dual use——

Dr. ERLICK. Right.

Chairman GLENN. How do they know we do not have dual use?

Dr. ERLICK. I think there is a critical criteria which relates to openness. Our program is completely open. Theirs is not. So the suspicions will continue until their program is completely opened as ours is.

Chairman GLENN. Ours is what? We have reports that people have visited our labs?

Dr. ERLICK. Yes sir, even the Soviets have visited our labs.

Chairman GLENN. Okay, they do. But we do not get to visit their labs over there?

Dr. ERLICK. No sir. There are limitations.

Chairman GLENN. Yet.

Dr. ERLICK. Not yet.

Chairman GLENN. We hope. All right.

Dr. ERLICK. That is correct.

Chairman GLENN. Any more questions?

Senator NUNN. Just let me follow up with one question. Mr. Kohl asked about the moral difference between chemical and biological and you referred back to the previous agreements and so forth, but I did not hear an answer as to what the real moral difference is between chemical weapon, biological weapon, conventional bomb, nuclear bomb—is there a philosophy here or is it one of, since people over the years have felt these weapons were repulsive for whatever reason, that we ought to try to ban them as a way of banning a traditional horrible weapon.

Is there a philosophy in terms of a distinction between the horrors that are produced by chemical weapons and the horrors that are produced in other forms of warfare?

Mr. GOLDBERG. I think one of the potential problems with chemical warfare in the wrong hands and used under the wrong circumstances was vividly illustrated by some of these photographs that you can have, unintended in some cases, enormous quantities of unintended civilian casualties because of some of the difficulty if they are used improperly and not used under the correct circumstances, unintended drift into civilian populated areas with these agents which perhaps would not happen with something with the pinpoint accuracy of the high energy explosive or shell.

Senator NUNN. Thank you. How about biological?

Dr. ERLICK. Sir, I would say with biological certainly we did have an offensive program prior to 1969, at least the philosophy then was that these were effective agents of warfare.

Subsequent to it has been a political decision to do away with this capability which we have done. And I really do not know what the moral aspects would be because we are not even allowed to think of these in terms of having a U.S. capability.

Senator NUNN. Thank you.

Chairman GLENN. Any last question?

[No response.]

Chairman GLENN. The problem is: how we morally kill people in war. I think we have seen, starting World War II, such mass destruction and civilians being killed right along with the military combatants drawing a line in that area and trying to make one moral and another moral is a distinction that I have great problems with.

We set off a nuclear weapon over Nagasaki, Hiroshima—those were mass—lots of civilians were killed and brought the war to end. I was going into Japan at that time, if that had not occurred. I thought it was great at that time. Looking back on it, was it proper? I do not know. We can debate that until we are all gone, I guess, but what is moral and what is not in a modern war is a pretty fine distinction that is sort of lost on me, I guess.

Dr. **Erlick**. Sir, I would just add one thing that our morality versus the morality of some other countries are not necessarily the same.

Chairman **Glenn**. I agree. We do not want to deliberately set out as a policy that anything happened we are going to kill millions and millions of people. Just as a matter of policy, you want to restrict that, obviously, but modern warfare is such that it is going to be very difficult to limit it just to the military combatants, I know that.

Thank you, gentlemen, we appreciate it. Thank you, very much.

Our next panel, one Robert Mullen Cook-Deegan, Doctor, representing Physicians for Human Rights, and Dr. Deborah Lief-Dienstag, Chairman, Department of Pediatrics, St. John's Episcopal Hospital, New York, we welcome you this morning and look forward to your testimony.

If you would both identify the other people with you this morning so we would have that for our record here, I would appreciate it.

TESTIMONY OF ROBERT MULLEN COOK-DEEGAN, M.D., PHYSICIANS FOR HUMAN RIGHTS,[1] ACCOMPANIED BY VICTOR SIDEL, M.D., PHYSICIANS FOR HUMAN RIGHTS

Dr. **Cook-Deegan**. Yes. I am Robert Cook-Deegan, and accompanying me is Dr. Victor Sidel also from Physicians for Human Rights.

Chairman **Glenn**. Good, welcome. Proceed.

Dr. **Cook-Deegan**. Thank you. As I said, my name is Dr. Robert Cook-Deegan, and Dr. Sidel and I are here today representing Physicians for Human Rights.

Physicians for Human Rights is a Boston-based group of about a thousand health professionals who are committed to investigating and trying to prevent human rights abuses throughout the world.

Before I get started, I would like to make sure that a couple of things get into the record. One is our written statement, and there was an accompanying statement prepared by the Physicians for Human Rights Working Group on Chemical & Biological weapons and third, we are releasing a report today at this hearing called "The Winds of Death." It is our report on a medical mission to the southeastern parts of Turkey to investigate Iraq's use of chemical weapons against the Kurds.[2]

Chairman **Glenn**. Are copies of that available today?

Dr. **Cook-Deegan**. Yes. Your staff has copies of all three.

Chairman **Glenn**. Fine. Are you releasing that to the press back here, also?

Dr. **Cook-Deegan**. Yes, we had some copies, although they have been snatched up.

Chairman **Glenn**. Okay, fine.

Dr. **Cook-Deegan**. I will first talk about what we did when we went to southeastern Turkey, and then I will try to put that into some sort of context.

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[1] See p. 242 for Dr. Cook-Deegan's prepared statement.

[2] See Exhibit No. 15 on p. 657.

I was one of three physicians who went to southeastern Turkey from the 6th to the 17th of October last year. The other two were Howard Hu, who is an epidemiologist from the Harvard Medical School, and Asfandiar Shukri, who is a Kurdish-speaking physician who directs an emergency service in Detroit.

We went to two refugee camps in southeastern Turkey to interview those who had been allegedly attacked by Iraqi poison gas on the 25th of August, 1988.

The first camp had about 5,100 people in it and the second camp had somewhat over 13,000 people in it.

We went into those camps armed with a prepared questionnaire to try to get detailed information about reports of the attacks, and what we got from those interviews was a consistent description of aircraft flying over the mountains releasing a foul-smelling yellow-gray cloud. The cloud came out of bombs that were dropped from those aircraft.

Within a couple of minutes, small animals and birds and chickens began to die. Soon thereafter, larger livestock began to die. And finally, the people who were closest to the bomb explosions began to die. Soon after they died, their skin turned dark and leathery, and their mouths and noses oozed a blood-tinged fluid.

In addition, there were many survivors, and I will get to that later in this statement.

But an important point here was that it was clear from our interviews that there were two kinds of attacks: that about two-thirds of the people that we interviewed, in fact, had been living in Kurdish villages, completely non-militarized Kurdish villages.

In addition, about a third of the people were from Pesh Merga encampments, and the Pesh Merga are the Kurdish fighters in that part of northern Iraq.

Those who survived these attacks described a consistent grouping of symptoms that included difficulty breathing, burning of their throat, burning and watering of their eyes, running of their noses, dizziness, nausea, vomiting, and headache. Most notably, their skin itched and it began to ooze a clear yellowish fluid. A half-hour to several hours later at least, they would develop these rather large blisters filled with a clear amber-colored fluid.

All of those symptoms that I just described were reported by at least 65 percent of the people whom we interviewed and who said that they had been subjected to poison gas attacks.

We tried to figure out what symptoms would help us best define the syndrome, and we came up with a set of four organ systems that were involved. First, the eyes with redness and swelling of the eye-lids. Shortness of breath and difficulty breathing, which indicates that the lungs were involved. Skin blistering that I have already described, and vomiting, which indicates gastrointestinal injury.

Roughly half of the people we interviewed had all four of those organ systems simultaneously affected. It is very difficult to explain how that would occur, particularly the skin burns, from any normal occasion. That corroborated quite strongly their verbal testimony that symptoms were related to a poisonous gas attack.

One 70-year-old woman described the attack to us in her own words, and this a quote from her:

> All of a sudden my eyes became blurry. I became short of breath and felt terribly weak. It had a bad smell like garlic and my mouth became bitter. About two minutes later, I began to feel sick and after that my skin felt like it was burning. I saw a lot of animals die before I felt sick. Birds, chickens, hens, cattle, sheep, and goats.
>
> And then I had difficulty breathing. My skin was burning, my eyes were burning, and my nose was running. There was water oozing from my skin, my face and my hands. The fluid was coming out yellowish, coming out from my skin which was severely burning and itching, too.

Because we went into two separate refugee camps, we were able to compare the answers of the people who had come from the same villages in northern Iraq, but were now living in camps that were separated by more than a hundred kilometers. And therefore, these people had not been able to talk to each other, yet they described very similar events in terms of the number of people that they reported as killed, the number of bombs dropped and the number of aircraft involved in the attacks, and so forth. Things that are relatively specific and quantifiable.

The fact that we got such similar answers from two different camps tended to again corroborate the validity of the stories they were telling.

About a month after we got back into the United States we learned about the investigations about another investigative team. This was a group headed by a British television journalist who went into northern Iraq surreptitiously and filmed, took video films at night, but also gathered seven soil samples from the areas allegedly attacked in late August. And from those soil samples that have been analyzed by two independent labs, one private laboratory and one government laboratory in the United Kingdom, it is very clear that at least mustard gas was used. They found traces of the mustard gas itself, sulfur mustard.

Our findings are consistent with the use of mustard gas, although mustard gas would not explain the consistent reports of rapid deaths. That suggests quite strongly that there was at least one additional agent used in addition to sulfur mustard.

We cannot tell precisely which agent was used from the verbal descriptions and the symptoms. There are too many kinds of these agents that would be expected to create a similar profile of symptoms.

But I do not think that should obscure the more important conclusion that lethal poison gas was used.

My description, I think, has been a bit technical. I think the true meaning of our findings are better expressed in the words of an 8-year old girl. Her picture is on page 8 of the report that we submitted for the Committee earlier today.

Her name was Aagiza. She was actually tending livestock a couple of hundred meters from her home on the day of the attack. Her mother and father and twenty-year old brother were very close to their house and Aagiza looked over between 6:00 and 6:30 in the morning on August 25th, and described the following events:

> I saw two airplanes overhead and they dropped some bomb. It made smoke—yellowish-white smoke. It had a bad smell like DDT, the powder they kill insects with. It had a bitter taste.
>
> After I smelled the gas, my nose began to run and my eyes became blurry and I could not see and my eyes started watering, too. And I still have some of the effects like my blurry vision and I have these things——

She at that point pointed to skin blisters that 5 weeks after the event were still apparent to us and of which we took some photographs.

> Over my chest. I saw my parents fall down with my brother after the attack and they told me they were dead. I looked at their skin and it was black, and they weren't moving. And I was scared and crying and I did not know what to do. I saw their skin turn dark and blood coming out of their mouths and their noses. I wanted to touch them but they stopped me and I started crying again.

About 5 weeks after the event, we first spoke with Aagiza. At that point, she had just started talking to the people in the camp a couple of days before. She had remained completely silent for about 5 weeks.

I think that our survey documents one small fragment of a dual catastrophe. The Iraqi chemical weapons attack on the Kurds is a catastrophe. First of all, in terms of the death, the injuries, and the human suffering that we have described. We may never know the true total of casualties. What we already know, however, fully justifies the conclusion that this was a premeditated public health disaster.

But this is a catastrophe in a second and even larger sense. It represents a major and dangerous breach in the international agreement that human beings, no matter what the circumstances of war, rebellion, or conflict should never be subjected to poisonous gas or other chemical weapons. It is not merely human beings who are assaulted in such an attack, it is our common humanity.

As physicians, we call for a total ban on the development and manufacture and deployment and use of these agents.

Thank you.

Chairman Glenn. Thank you, very much, Doctor.

Dr. Lief-Dienstag?

TESTIMONY OF DEBORAH LIEF-DIENSTAG, M.D., CHAIRMAN, DEPARTMENT OF PEDIATRICS, ST. JOHN'S EPISCOPAL HOSPITAL, NEW YORK NY.,[1] ACCOMPANIED BY VICTOR BURNETT, M.D., CHAIRMAN, DEPARTMENT OF MEDICINE, ST. JOHN'S EPISCOPAL HOSPITAL, NEW YORK NY

Dr. Lief-Dienstag. Thank you. Good morning, Senator Glenn. I would like to thank the Committee very much this morning.

My name is Dr. Deborah Lief-Dienstag, and I am Director of Pediatrics at St. John's Episcopal Hospital in Far Rockaway, Queens, which is the division of the Episcopal Health Services of Long Island under the direction of the Right Reverend Bishop Robert Witcher.

Dr. Victor Burnett, the hospital's chairman of the Department of Medicine and I would like to thank you for this opportunity.

We have all heard so graphically from reports from the press and also the eloquent statements of the speaker that preceded me of last year's use of chemical weapons of chemical weapons during the Iran-Iraq war.

According to these reports, Iraq used these chemical weapons against Kurdish civilians. At St. John's Episcopal Hospital we had the opportunity to observe, diagnose, and treat a handful of these victims. As far as we know, St. John's Episcopal Hospital is the only hospital in the United States to treat victims of chemical warfare since World War I.

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[1] See p. 248 for Dr. Lief-Dienstag's prepared statement.

On the evening of March 29, 1988, five civilian victims of the conflict were brought to our hospital. Three girls ranging in ages from 9 to 12 years and two adults, a man and a woman. These people spoke no English, and our staff communicated with them through a Kurdish interpreter furnished by the Iranian Consulate in New York. The children told us the following story.

On the morning of March 16, planes were sighted over the village of Halabja, Iraq, which is a Kurdish village on the Iran-Iraq border that had previously been captured by Iranian troops. You have all seen some of the pictures that were taken and blown-up by the previous speaker on the Halabja's attack.

Earlier in the morning, the children had been warned to go into the cellars of their homes for "safety," but the adults of the family did not accompany them. Suddenly, the children heard the sound of planes overhead and they ran outside to see this very unusual event over a mountain village.

As the children looked upwards, they saw a dark cloud descend over the village. So they began to cough and sneeze, their eyes began to burn and water, and they began to itch over their entire bodies. In the following hours, they experienced nausea and vomiting, and over the next several days their skin began to blister and slough.

According to a very brief medical note that accompanied them to the United States the children and the two other patients had been treated in a hospital in Teheran, and received what appeared to be appropriate medical burn care.

Approximately after 2 weeks after the attack the children and two adults were flown to St. John's Episcopal Hospital in a medically equipped airplane chartered by the Iranian Government. The Iranian officials who arranged this transfer to the United States explained to us that the patients had been sent abroad, one because of the large numbers of chemical warfare victims taxing Iranian medical facilities, and two to bring the plight of the victims to the attention of the world's medical community.

The more severely ill patients either remained in Teheran, or were brought to European countries. The five victims who arrived in the United States at our hospital were apparently selected for their ability to travel and not necessarily out of acute medical necessity.

The children, for whose treatment I was responsible, exhibited eye and skin burns and lung damage in varying degrees of severity. All three girls had chemical burns to the eyes, and were acutely sensitive to light. The children also had first and deep second degree burns on their arms, neck, and faces. And one child exhibited burns on her chest and groin as well.

A first degree burn penetrates the upper layer of the skin. A deep second degree burn, which extends down to a deeper skin layer is extremely painful and causes blistering and scarring. All three of the little girls had abnormal chest x-rays showing scarred lung tissue. One of the girls had pneumonia and required supplementary oxygen because of difficulty breathing. And we have supplied the Committee with photographs of the children as they appeared several days after their admission to the hospital.

The most severely ill of all the patients was the 30-year old adult woman who was admitted to our Health and Intensive Care Unit. Dr. Burnett was primarily responsible for the treatment of this woman and the other adult patient.

The woman was pregnant at the time of the attack. Ten days after the exposure to the poison gas while still in Iran, she delivered premature twins who died shortly after birth. On arrival in the United States, her chief medical problems were chemical burns of the lungs and a severe secondary bacterial pneumonia.

A secondary pneumonia is a pneumonia cause by bacterial growth in damaged lung tissue. Her lungs were so badly scarred that their ability to transfer oxygen from the air to her blood and blow off carbon dioxide, was severely and permanently impaired. She will be a pulmonary cripple for the rest of her life.

The woman also had chemical burns of both eyes and first and second degree burns of her chest, back, groin, leg, and toes, all of which improved with treatments.

In treating the five patients, we consulted with Professor A. Heyndrickx, Chief of the Department of Toxicology in the State University of Ghent, Belgium, and also the Project Director of the United Nations International Development Organization.

Dr. Heyndrickx is an internationally recognized expert on the toxicology of chemical weapons. That is, the identification and measurement of the effects of chemical poisons in humans.

Dr. Heyndrickx performed toxicological tests of hair, urine, and blood of the victims we treated. In his conclusions, he concluded that at least three war gases had been used in combination: mustard gas, an organic phosphate commonly known as nerve gas, and cyanide derivatives.

In a recent follow-up conversation with Dr. Heyndrickx he reported that in his experience with victims of poison gas and inhalation, damage to the patients' lungs was irreversible and progressively worsens.

The patients were seen and followed in the hospital by specialists in pulmonology, infectious disease, hematology, ophthalmology, dermatology, plastic surgery, and mental health professionals. My contact was primarily with the children, of course, who were initially very frightened, suspicious, and non-cooperative. Their one word of English when they arrived was "Pepsi."

Understandably, their experiences of the past weeks had left deep psychological scars. The children cried a great deal for their parents. They appeared to relive the horrors of walking about their village in the hours after the attack amidst the dead and the dying.

What was the most striking, I think, about the children, and if you look at the photographs I believe you will agree, was not only their burns, they appeared years older then their ages, almost like elderly women.[1]

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[1] See Exhibit 14 on p. 654.

During the course of their treatments, the girls were showered with toys and clothes and spent a great deal of time playing. But there remained a profound sadness about them, and many times one or the other would spontaneously began to cry and would be joined by the other two.

Over the course of their 3-week hospital stay, the children warmed to our staff who succeeded in winning their confidence and affection. Their was an outpouring of kindness and genuine concern towards these children, both from the hospital staff and the local community.

In treating these patients we paid little attention to the politics, publicity, or the international tensions that occasioned their admission to the hospital. They were human beings in pain, and we did our best to heal and comfort them in the very short time they were with us.

We are also submitting for the record copies of our treatment summaries for each of the patients as well as a copy of Dr. Heyndrickx' report on the analysis of the patients' biological samples.[1]

Senator Glenn, we will be glad and happy to answer any questions you may have.

Chairman GLENN. Thank you, very much.

Your children were especially vulnerable. You were treating children mainly or were the adults just as much affected as the children?

Dr. LIEF-DIENSTAG. Apparently, according to what Dr. Heyndrickx told us, 70 percent of the severely affected victims were women and children, and they appear to be more subject to the effects, but certainly all human beings are subjected to these effects.

Chairman GLENN. I am sure they are. These are matters of degree, I suppose, but I wondered since you had mainly children that you talked about whether they are more susceptible to this or not. Dr. Cook-Deegan, do you know?

Dr. COOK-DEEGAN. There is no way to know from our data. We actually interviewed people from 6-years old to 70-years old, but the literature does suggest that people at the extremes of the ages are the people who are most vulnerable to any disease.

Chairman GLENN. The attack occurred on August 25th. How long would it continue to affect people, or kill people, or be a lethal dose after that attack? Would it be days, weeks, hours?

Dr. COOK-DEEGAN. It depends very much on which agent was used. There were continuing deaths for about 2 weeks from the acute effects of the gases in the context that we went into. And that is consistent with the reports from World War I.

Chairman GLENN. Mustard gas, nerve gas, and cyanide, Dr. Heyndrickx sent these to a lab in Belgium. Did that happen to be the nearest place to send it, or do we have adequate facilities for doing that same kind of analysis in this country?

Dr. LIEF-DIENSTAG. We are not aware of anyone else who volunteered. We had called the United Nations and were referred to Dr. Heyndrickx who was very helpful and willing to assist.

Chairman GLENN. Where is he?

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[1] See Exhibit 12 on p. 630.

Dr. **Lief-Dienstag**. He is at the university.

Dr. **Burnett**. Dr. Heyndrickx actually came to the hospital and saw these patients. He happened to be in New York at the time that these patients were brought into our hospital.

Chairman **Glenn**. Is he from Belgium, then?

Dr. **Burnett**. Yes. He is a professor at the University of Ghent.

Chairman **Glenn**. Okay.

Dr. **Burnett**. And therefore, we arranged with him to analyze the samples.

Chairman **Glenn**. Do we have facilities in this country that ought to do that adequately?

Dr. **Cook-Deegan**. Yes, we could do that in various labs around the United States. Most of those labs actually are military laboratories.

Chairman **Glenn**. Yes. I suppose a long-term lifetime impact of these sub-lethal exposure to these agents is difficult to predict. You just have to wait and see, I guess. It would be the degree to which they were impacted to begin with, but I would presume it would be a lot of long-term medical problems.

Dr. **Burnett**. Well, the adult woman, this 30-year-old lady certainly was extremely ill at the time she left our hospital, and as Dr. Dienstag described it, she is certainly a pulmonary cripple, in fact I wonder whether or not she is still alive.

According to Dr. Heyndrickx, the pulmonary problem tends to be progressive, however, in World War I, the people who were gassed in World War I, many of them went on to live a long period of time, although they were left with a chronic pulmonary ailments as a result of their exposure.

Dr. **Sidel**. We might also want to comment on that question of long terms consequences. There has been evidence coming out of World War I of the long term consequences of the "poison gas" attacks. While the evidence is equivocal on the progression of the pathology over a long time, there is no question that much of the damage that is done in the attack lasts the lifetime of the individual.

A study has found long-term abnormalities of memory, abstraction, mood and motor reflexes in pesticide victims and, since nerve gases fall into the same organo-phosphate family of chemicals, they will almost certainly have similar kinds of long-term results.

I wonder, if I might Senator, refer back to a question you asked earlier about why these weapons are viewed in a special moral category.

First, of course, is the fact that they have been seen as abhorrent from the time of recorded history. To break down that abhorrence seems to us as members of the medical profession to be a particularly dangerous thing to do.

Second, these kinds of weapons are particularly dangerous to those at the edges of the age spectrum, to those who are extremely young, to those who are extremely old, to those who are sick, to those who are poor and malnourished or otherwise least able to resist.

That is also true, of course, to a certain extent also from the blast injuries or burn injuries from bombs or shells. But there is something peculiarly—and I do not quite know how to phrase it—

abhorrent—particularly to physicians of using disease, of using chemicals inhaled as a gas, to damage human beings, to cause them permanent torture, and for the weakest of them to cause death. That causes us—as Physicians for Human Rights—to urge you, as indeed you and the members of your Committee have done, to pay special attention to these weapons.

Chairman GLENN. Now, I did not want my earlier remarks to be interpreted as I am looking lightly at this; quite the opposite.

I went through two wars and I have seen a lot of war, and I cannot imagine war being any more hideous than it already is with conventional weapons, but it would be where you have potential for millions of people being killed with these weapons now, and what I am particularly concerned about now, obvious also from my earlier questioning—if you were in the room all during the whole morning—is what happens one of these days when these things now are common enough that we have some terrorists get some of this stuff and we find it being used in terrorist activities. Instead of blowing up airplanes, we put some in a hall, or we do whatever. It is too hideous to think about, but that is what we have to think about because that is where the threat is.

We are going to have to move along.

Senator LIEBERMAN. Thank you, Mr. Chairman. One question, Doctor. I gather you were in Turkey to treat some of the victims of the Iraqi attack. We have heard the number of 50,000 used to describe the casualties.

Did your visit there provide any evidence to support that figure? Was there any sense of how widespread the casualties were?

Dr. COOK-DEEGAN. Well, yes and no.

We can certainly confirm that there were very consistent reports of deaths.

I should clarify what the purpose of our trip was. We went hoping that we might be able to be a medical benefit, but it turned out that we were five weeks after the attacks by the time we could negotiate all things we needed to, to get in. And so most of the acute effects had, in fact, passed. Therefore, our primary mission was to find out what had happened rather than to provide treatment.

We can certainly confirm that there were casualties. We cannot, just because of the methods that we used, we cannot estimate how many there were. And furthermore, I do not think anybody else can because the events that happened—the attacks began on August 25th and continued for about a week. But the only people who were successful at crossing the border into Turkey were the people who could walk across that border within a one week period before the Iraqi forces sealed the border and prevented anybody else from getting out.

So, we were only talking to people who were from a very narrow border region. There were lots of reports of other attacks, but we have no way of confirming or denying their validity.

Senator LIEBERMAN. One more question, if I may. This takes us back to earlier discussions of nuclear arms control. One of the responses to the advent and spread of nuclear weapons was not only to try to control them, but to defend against them by deterrence as well as by the old civil defense programs.

From a medical point of view, is there anything that a country worried about chemical or biological attack can do to limit the impact of such an attack?

Dr. SIDEL. The general answer to that, Senator, is to have a good public health system and to have a society that protects the weak and the poor. But that is a general statement.

I think the issue of specific defenses against chemical and biological weapons gets us into a peculiar loop, the great difficulty of separating what constitutes "defensive research," particularly for biological weapons, from "offensive research." To mount a program specifically for medical "defense" against such agents would appear to others in the world to be simply a continuation of an arms race in these weapons.

I say—and I say this also, as a past President of the American Public Health Association—if we want a defense against these kinds of weapons, it is to develop a healthy society and a good public health system.

Senator LIEBERMAN. I understand that we do not want have an escalation of offensive and defensive chemical and biological weapons. From a public health point of view, however, assuming that the delivery of chemical and biological toxins is not fatal before treatment can arrive, there is nothing that a good public health system would not now be able to do to render care and treatment to those people. I am thinking about what can be done to limit the impact on a civilian population if this nightmare occurred?

Dr. SIDEL. If we are talking about diseases that occur in nature, then all countries of the entire world should have available in the open literature materials for dealing with these naturally occurring diseases.

The same for chemicals that are used for peaceful purposes—the organo-phosphates, for example. In the open literature, everyone in the world should be aware of what one does if these problems occur. But to develop a specific defensive system against these weapons for military use could look to other nations of the world as though we were preparing to engage in such warfare and simply preparing to defend our own population.

Senator LIEBERMAN. Does anyone else want to add to that?

Dr. BURNETT. Complementing what Dr. Sidel has just said, it is clear that in order to accomplish some defense from these weapons, that the population would have to be well-educated as to what needs to be done in the event that there is a poison gas attack. There are things that can be done and, of course, the facilities to treat these problems would have to be available, the materials would have to be available, and people who are the victims would have to know what to do. So that I think would be most important.

And of course, the obvious well-known gas mask which can protect against certain aspects of poison gas.

Senator LIEBERMAN. Good point. One can imagine in the Middle East where these are proliferating now, it might make good public policy sense to try to educate the population about what to do in the event of an attack to limit its impact on people.

Thank you.

Senator NUNN [presiding]. I am sorry I did not get to hear all of your testimony. I read the testimony and I found it most helpful in getting a grasp of the devastating consequences, so we appreciate your being here. I just have one follow-up, or two follow-ups on that.

We talked about defensive efforts being taken perhaps as part of an arms race. One of the things, I think, that needs to be weighed against that very valid observation is that when you do not have defensive measures that can be taken, you are not in a position to deter the offensive use as well as when you have defensive systems. So, in terms of what military people think about not having defensive systems, they feel that if you do not, the number of them—and this has worked its way into policy—if you do not have defenses or some counter capability to deter chemical attack particularly, then you have to threaten the escalation to nuclear weapons as a part of deterrence.

So it is not a simple matter as to whether you take defensive steps or not. If you wind your way from a point of not having defensive weapons to avoid one type—a very valid concern—do you then get yourself in a position where you have another way of seeing nuclear war breakout—that is as a response to a chemical attack.

Do you have any observations on that?

Dr. SIDEL. Your asking it that way, Senator, is like asking a "When did you stop beating your wife" kind of question.

Senator NUNN. That is correct. That is the implication. That is where we are. That is where we are going.

Dr. SIDEL. If I may have the temerity to quote Albert Einstein, perhaps we need "a new method of thinking." Perhaps the time has come in both the biological and chemical weapons field as well as in the nuclear weapons field to burst out of this attack, deterrence, defense kind of dilemma we find ourselves, to start thinking in very different ways about what represents national security, and what represents global security.

If one wants, as Physicians for Human Rights does, to have concern for the human rights of people around the world means that we have to start thinking about these weapons in quite different ways.

Senator NUNN. I would say that is also valid, but who starts that thinking and how do you get people on the other side to think that way, too?

All of us need to have a new way of thinking—I would agree with that, but it is not easy to know when you start and where, and if you are a military commander sitting in West Germany and they tell you that you have no defense against chemical weapons and no capability of even threatening offensively, and your men can be subjected to attack, or if you are an air base commander, then you start asking what are we going to do? What is our alternative? And that logic leads to either some nuclear threat alternative or sometimes to a breakdown morale in peacetime, even.

Dr. SIDEL. Obviously, I am out of my area of special competence, Senator, but it seems to me this is not a question, of policy, that should be left to the field level. Such policy questions are what we have the United States Senate and Committees like this excellent one for. This is the place where new thinking on this issue has to begin.

Senator NUNN. I think that is a "have you stopped beating your wife" answer. [Laughter.]

Dr. SIDEL. Fair enough.

Senator NUNN. Fair enough. Could one of you—I do not know who I would direct this to, but whoever would like to take it on—you have spoken about chemical weapons, can you compare the impact of biological warfare with chemical warfare as far as what the medical community would be faced with. Is there a way to compare those?

Dr. SIDEL. Biological weapons, raise special kinds of concerns for the medical community. In our supplemental testimony we have gone over some of those differences.

First in contrast to attack by chemical weapons, it may not even be clear that the attack by biological weapons has taken place. It can be an insidious infestation by the organisms.

Second, the diseases caused by biological weapons may have more insidious onset cases that do not occur all at once and can occur over the course of days, weeks, or even months.

Third, the medical consequences may be less easily identifiable. The burns or the lung damage that occur from chemical weapons, are very clear and immediate. The medical consequences of the biological weapons may not even be recognized as having been caused by an atom.

Finally, and in a sense of most horrifying to us as physicians is the fact that biological weapons may turn human beings themselves into carriers. They become the agents of the transmission of communicable disease and themselves become part of the attack. In these ways biological weapons are different and perhaps even worse than chemical weapons. I do not want to distinguish between types of weapons that we find abhorrent, but as physicians, the idea of using disease as a weapon has some special terror to it.

Senator NUNN. I can understand that. Did any of you have any other observations, not having been here for all the questions, I am not sure whether everything has been covered that you wanted to offer an opinion on. I know you have given your opening testimony. Any other observations, suggestions?

Dr. COOK-DEEGAN. There are a couple of points that I think might have gotten obscured.

One thing that I wanted to make clear from our statement is that we really are talking about two kinds of events, even in the case of Iraq. In one case, there was a clear war, even if it was undeclared, there is obviously a war going on between Iran and Iraq, and the Halabja attacks occurred when the war was still under way although it was winding down.

The attacks that we investigated in southeastern Turkey, however, occurred after the cease-fire, and those poison gas bombs were dropped on Iraqi-zone citizens. And it puts this in a totally new light. It becomes a human rights issue rather then a purely military issue.

And another thing, I think that this body can take great pride in having passed a sanctions bill. One of the things that is irritating about this is that the Iraqi Government clearly dropped gas on its own citizens and then lied about it. It has broken the taboo against the use of chemical weapons repeatedly for 6 years, and yet there has not been much done about that.

It seems to me that the counter-incentives to use of chemical weapons have to be implemented at the political level, and it is probably political and economic sanctions such as those incorporated in Senator Pell's bill and then passed by the rest of this body are the best ways to get at that.

And I would like to assert our support for such efforts on behalf of our organization.

Senator NUNN. Thank you. Have any of you addressed the question beyond the physical damage to the patients that have been treated, whether you can tell now or would venture an opinion about the psychological damage?

Dr. LIEF-DIENSTAG. Well, certainly in dealing with the children they exhibited all of the medical symptoms of depression. In all of the manifestations, they had flashbacks of the events. They described them very clearly, although, obviously, initially they were rather reticent about talking to a soothing interpreter. After a while, they really gave us very clear-cut stories of what happened, and still continued to have nightmares.

Some of it, I think, was probably cultural shock. What I told one of the other Committee members before was every time we took the kids to an elevator, they screamed throughout the entire trip up and down because I do not think they ever quite understood what was happening to them, and that, I think, has a very devastating effect.

Obviously all of the children are orphans, as well. This woman that I had described lost not only these twins but was a mother of six children. All of her children had died at the time of the attack.

What I wanted to leave you with is just the very human side of it. It is very easy to say that 50,000 people were killed. It is much more difficult to describe, you know, three little girls and just what waifs they looked like when they first came here.

The other point also—just to clarify—is Halabja is Iraq. The chemical warfare that was used was used against Iraqi citizens by the Iraqi Government themselves during the war, although the area had been captured by Iran, it was certainly the people we encountered and the people they described were civilians and had nothing to do with the conflict.

Senator NUNN. Thank you, very much. We appreciate all of you being here. We would like to stay in touch with you because this is obviously not a short-term effort, and there is going to be no short-term solutions to all of these problems. But I thank you on behalf of the Committee, and indeed thank you on behalf of humanity for your tremendous efforts.

Our next panel will testify on the proliferation of chemical and biological weapons. Mr. Seth Carus, a Fellow at the Washington Institute for Near East Policy will testify on proliferation in the Middle East, an area in which we all have particular concern. Mr. Carus has written on the Middle East military affairs and is a former senior military analyst for the American-Israel Public Affairs Committee. Mr. Carus has just recently published a monograph on chemical warfare in the Middle East.

Ms. Elisa Harris is currently a guest scholar at the Brookings Institution and an SSRC-MacArthur Foundation Fellow in International Peace and Security Studies. She has previously served as staff consultant to the House Foreign Affairs Committee, and as a visiting Fellow with the Royal United Services Institute for Defense Studies. Ms. Harris is the author of a recent article on the proliferation of chemical weapons in 1989 Brassey's Defense Yearbook.

We are pleased to have the both of you here today and we will be pleased to have your testimony. I am not sure who will go first, but either way suits us.

TESTIMONY OF ELISA D. HARRIS, GUEST SCHOLAR, THE BROOKINGS INSTITUTION

Ms. HARRIS. Thank you, Mr. Chairman. I would like to begin by thanking the Committee for inviting me to testify this morning on this most important subject.

I have a brief statement, but I would be grateful if the full text of my prepared statement,[1] as well as this recent article that I authored on the subject of chemical weapons proliferation could be made part of the full hearing record.[2]

Senator NUNN. Without objection it will be part of the record—your entire statement.

Ms. HARRIS. In my testimony this morning I will try to shed some light on the problem of the spread of chemical weapons outside NATO and the Warsaw Pact.

I will begin by discussing the nature and the extent of the problem, particularly which countries are believed to have chemical weapons as well as why and how they acquired their capability.

I will then suggest some reasons why the international community should be concerned about chemical weapons proliferation.

Finally, I will discuss how we have tried to deal with this problem in the past few years and what we might do in the future.

Those of us who have tried to explore the problem of chemical weapons proliferation outside NATO and the Warsaw Pact have encountered a variety of obstacles.

First and foremost among them has been the reluctance of most Governments to identify specific chemical weapons states. Instead, Government officials speaking on the record have tended to characterize the problem in terms of the number of such states. Even these numerical estimates, however, are imprecise and contradictory.

The second problem we have encountered while trying to analyze the CW proliferation issue is that Government officials generally do not explain how they define a chemical weapons state. After all, having the capacity to produce chemical weapons, or chemical warfare agents, is very different from possessing a stockpile of such weapons.

There are probably a variety of reasons why Governments generally do not identify CW possessor states, and are not more specific in discussing capabilities. In some cases, they may be uncertain about precisely who does in fact have what capability. After all, any country with a petrochemical, pesticide, fertilizer or pharmaceutical industry has the potential—in terms of equipment, raw materials, and technical expertise—to produce some chemical warfare agents.

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[1] See p. 267.

[2] See Exhibit No. 11 on p. 605.

And I emphasize agents here.

Governments may also remain silent in order to avoid drawing attention to chemical weapons program acquired with the assistance, wittingly or unwittingly, of their own chemical companies.

In other cases, they may have political interests that may preclude them from embarrassing new entrance into the chemical club.

Finally, Governments may fear that if they are more forthcoming with information on chemical warfare activities of specific states, the sources of this information and the methods by which it was acquired might be compromised.

This brings us to our third problem: that of the credibility of the available information. The U.S. Government, it must be acknowledged, has been more forthcoming than most in terms of releasing information. But the fact remains that much of what we know about chemical weapons programs in the developing world comes from press reports citing unnamed Government officials and what are said to be classified documents.

This credibility problem is not necessarily helped by multiple press reports containing the same basic information, as these may all be derived from the same initial source or report.

Erroneous information may thus be unintentionally perpetuated.

It is also possible that false or exaggerated reports of CW proliferation may be propagated intentionally. Concern about CW proliferation can be used to increase support for national CW programs. CW possession or use charges can also be useful for discrediting a domestic or foreign adversary.

Indeed, many of the more doubtful chemical weapons charges probably fall in this category.

In light of all these difficulties, those of us who try to analyze the subject must be clear about the sources of our information. I do not have access to intelligence data.

My conclusions, therefore, about the CW programs of specific countries are based entirely on publicly available information. I am not in a position to be able to say whether a given country has chemical weapons. The most I can do is try and organize the available information in a useful fashion.

The specific criteria I have developed for this purpose are as follows: Known chemical weapons states are those who have either declared that they possess chemical weapons or who's use of such weapons has been definitively confirmed. Probable CW states are those reported by NATO or western Government officials on or off the record as producing chemical weapons, possessing them under national control or using them.

Seeking to possess CW states are those reported by NATO or western officials on or off the record as trying to acquire chemical weapons. Doubtful CW states are those reported generally by domestic or foreign adversaries as possessing CW under national control or of using chemical weapons with no confirmation by NATO or western officials.

On the basis of these criteria, Iraq is the only non-NATO/Warsaw Pact country known to possess chemical weapons. Eleven other countries, largely in the developing world are probable CW states. The CW capabilities of eight of these countries have been mentioned in press reports citing U.S. Government officials speaking on the record. They include Burma, China, Iran, North Korea, Syria, Taiwan, Vietnam, and most recently Libya.

The three remaining countries, Egypt, Ethiopia, and Israel have been discussed in press reports citing unnamed Government officials and what are said to be classified documents. South Korea has been identified by unnamed U.S. officials as a country seeking to possess chemical weapons.

At least 18 other countries have been accused of either possessing or using chemical weapons, but there has been no confirmation of these claims either on or off the record by NATO or western officials. These doubtful chemical weapons states includes Afghanistan, Angola, Argentina, Chad, Chile, Cuba, El Salvador, Guatemala, India, Indonesia, Laos, Mozambique, Nicaragua, Pakistan, Peru, the Philippines, South Africa, and Thailand.

It is difficult to know with any certainty why Iraq, the 11 probable CW states and South Korea might have decided to acquire chemical weapons. It is possible, however, to draw some tentative conclusions about the role of political and military incentives in the CW policy decisions of these countries based upon publicly available information.

It would appear that none of these countries acquired chemical weapons for reasons of political prestige. In order for chemical weapons to have political value as a poor man's weapon of mass destruction, possessor status would have to be known and acknowledged by the country concerned. Yet, even Iraq did not openly acknowledge its CW activities until July of 1988. Indeed many countries have emphasized just the contrary—that they do not possess chemical weapons.

This suggests that chemical weapons do not have the same sort of prestige value as nuclear weapons and that decisions in the developing world to acquire chemical weapons are therefore based largely on military rather that political incentives.

Developing countries may in fact view the military utility of chemical weapons differently than industrialized states. As a consequence, developing countries may have a variety of military incentives for acquiring such weapons. For example, in some countries chemical weapons may have been acquired for use in counter-insurgency operations in their own or neighboring states. Developing countries facing superior conventional forces may also have a powerful incentive for acquiring chemical weapons. Countries in the developing world may also have acquired chemical weapons in order to deter enemy chemical use through the threat of retaliation in kind. Finally, at least some developing countries may have acquired chemical weapons in part to counter an adversary's nuclear capability.

The CW acquisition decisions of these countries, therefore, may have reflected a variety of military incentives. These military incentives probably out-weighed existing moral and legal constraints on chemical warfare, which in any event may have weakened in recent years. CW armament programs in the developing world probably have been helped even more by the erosion of technological barriers to CW acquisition.

Countries interested in acquiring chemical weapons can either bypass the technological problems altogether by procuring such weapons from other CW states, or can seek to develop their own chemical weapons production capability by purchasing the necessary equipment and chemicals on the international market.

Five developing countries may have previously received chemical weapons directly from the Soviet Union. These include Egypt, Ethiopia, Libya, Syria, and Vietnam. Chemical weapons and technical assistance may also have been provided by one country to another. Syria is reported to have helped the Iranian CW effort. Iran is said to have supplied chemical weapons to Libya in return for Soviet made mines, while Israel is reported to have provided chemical agents to Taiwan and advice on CW matters to the Chinese.

A majority of these countries, however, are now said to possess indigenous production capabilities often developed with equipment and chemicals purchased from western companies. These include Iraq, Burma, China, Iran, Israel, Libya, North Korea, Syria, Taiwan, and Vietnam. Egypt also may have its own CW production capability.

The Soviet role in the CW proliferation problem has thus almost surely been over-stated.

Mr. Chairman, there has been much hand wringing of late about the alleged Libyan chemical weapons plant, but almost no discussion of the wider implications of CW proliferation. Let me suggest a few reasons, therefore, why the international community should be concerned about the spread of chemical weapons more generally.

CW proliferation could make conflict itself more likely, particularly in unstable regions such as the Middle East. Following confirmation of Iraq's use of chemical weapons in the gulf war, there were reports that the United States had examined the feasibility of airstrikes against Iraqi CW sites. More recently, Israel was reported to be considering a preemptive strike against a Syrian installation. Either of these strikes could have led to a military confrontation between the countries involved.

CW proliferation could also make conflict more destructive, especially in areas such as the Middle East and Asia, where ballistic missiles are also proliferating. During the gulf war, Iraq and Iran used conventionally armed missiles in their attacks on each other's cities. In the final months of the war, however, Iraq threatened to launch chemical strikes against large Iranian cities. At least seven other probable CW states, China, Egypt, Israel, Libya, North Korea, Syria, and Taiwan also possess ballistic missiles which could be modified to carry chemical warheads. South Korea also has a conventional missile capability.

The use of chemically armed ballistic missiles by any of these countries could lead to unprecedented civilian casualties. Moreover, if chemically armed ballistic missiles were used against Israel, it could trigger a nuclear response.

The proliferation of chemical weapons and sophisticated delivery means like ballistic missiles also has implications for the United States and the Soviet Union. With this type of military power in the hands of developing countries, both countries may find it increasingly difficult to pursue their regional interest. More importantly, the use of chemically armed ballistic missiles in a region like the Middle East could draw the superpowers in on the side of their respective allies culminating in conflict between east and west as well.

Various proposals have been put forward in recent years to deal with the problem of chemical weapons proliferation. One idea that has been pursued since 1984, when it became clear that Iraq's chemical weapons have been produced with chemicals and equipment purchased from western chemical companies, has been that of export controls on the precursor chemicals and equipment needed to make chemical agents. A second idea for halting the spread of chemical weapons, first proposed by General Secretary Gorbachov in November 1985, is that of a chemical non-proliferation treaty.

Neither of these proposals will solve the CW proliferation problem. At best, export controls will make it more difficult and more costly for the potential proliferator to acquire chemical weapons and may provide supplier countries with early warning of such proliferation.

A chemical non-proliferation treaty is a non-starter politically, as it would discriminate against those countries that do not possess chemical weapons and would detract from efforts to achieve a chemical weapons ban.

In my view, the Reagan Administration was correct in its assessment that the best potential solution to the problem of chemical weapons proliferation is a chemical disarmament treaty. Verifying compliance with such a treaty will not be easy. It is, however, possible.

The real challenge, though, will be to convince developing countries that have acquired chemical weapons that their security interests can be met by other means. If countries like Iraq refuse to participate in the chemical weapons ban, the treaty's non-proliferation objectives will not be realized and other countries may not agree to ratification.

CW proliferation in the developing world may thus make the elimination of chemical weapons both more urgent and at the same time more difficult to achieve.

Thank you, Mr. Chairman.

Senator NUNN. On that cheery note, we will turn to Mr. Carus. Thank you, very much, Ms. Harris. That was a very thorough and helpful report.

TESTIMONY OF W. SETH CARUS, WASHINGTON INSTITUTE FOR NEAR EAST POLICY

Mr. CARUS. It is an honor to be asked to testify before this Committee since there are few subjects more important today than the proliferation chemical and biological weapons.

Mr. Chairman, I would request that my full statement in the paper that I did on chemical weapons proliferation in the Middle East be submitted for the record.[1]

Senator NUNN. It will be part of the record without objection.

Mr. CARUS. I would like to start by summarizing the current situation in the Middle East. Unfortunately the news is mostly bad. The genie is out of the bottle. Not only is there little prospect of getting it back into the bottle, but in the absence of effective containment policies, the situation is likely to get worse before it gets better.

Six countries in the Middle East have the capability to use chemical weapons. This list includes Egypt, Israel, Syria, Iraq, Iran, and Libya. Four of these countries are believed to have made use of chemical weapons: Iraq, Iran, Libya, and Egypt. The first three countries, which have also been involved in state sponsored terrorism, used chemical agents in the past few years.

The Egyptians were the first in the Middle East to acquire and use chemical agents. During the 1960's, they appeared to have possessed stocks of mustard gas and phosgene, and according to some reports, may have had nerve agents as well. By the early 1970's, it appears they had a reasonably well-developed chemical warfare capability and they have continued to work on chemical weapons since then.

Significantly, they did not use chemical weapons against Israel during either the 1967 or the 1973 wars.

Senator NUNN. Would you venture your opinion on why that was?

Mr. CARUS. Well, I believe it was the opinion of American military officials who went to the Middle East after the war, that the Egyptians were essentially relying on their chemicals as a deterrent against what they presumed to be an Israeli chemical capability, and that they were quite aware that if they gratuitously used chemical weapons that they could provoke some kind of massive Israeli response, either conventional or, perhaps by 1973, nuclear.

Senator NUNN. So, the nuclear component, as we were discussing a little while ago, may have psychologically entered into the decision by the Egyptians not to use chemical weapons.

Mr. CARUS. It is a very possible. I am not sure anybody knows for certain.

Senator NUNN. The possible threat; not even the implicit, but the possible threat. Is that right?

Mr. CARUS. I think that is a plausible interpretation of events, but as I say we do not have any real hard evidence.

To continue, it appears that the Israelis acquired chemical agents in response to Egyptian use of such weapons. Their program was in place by 1973 when they are known to have had an offensive attack capability.

Currently, it is believed that they have a reasonably sophisticated chemical weapons program that includes the production of nerve agents. Israel is one of the countries in the region that has not used chemical weapons, they have never publicly admitted that they have chemical weapons, and they have never threatened to use them.

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[1] See p. 282.

The Iraqis initiated efforts to acquire chemical agent production facilities in the mid-1970's. By the early 1980's with the active assistance of companies from the industrialized world, but especially from West Germany, they built facilities able produce up to 1000 tons of chemical agent a year.

The United States acting with many of its allies was able to interfere to some extent with Iraqi production by preventing exports of precursor chemicals and by working with European countries to do the same. However, as recent disclosures of sales of chemical precursors from the United States to Iraq indicate Baghdad is still able to obtain the necessary raw materials that it needs.

In addition, the Iraqis are now believed to manufacture some of the precursor chemicals required to make agents. Iraq employed poison gas against the Iranians and Kurds extensively during the recent hostilities in the Persian Gulf. These attack culminated in a series of vicious attacks against targets inhabited mainly by Kurdish civilians. Iranian statistics suggest that as many as 50,000 people were killed or wounded by Iraqi chemical attacks. Although these figures may be exaggerated, it is quite clear that a great many people were killed or wounded by Iraqi chemical agents.

Little is known of the Syrian chemical program. However, by the mid-1980's it was known that Syrians were producing chemical agents, including nerve gas. It has also been reported that the Syrians have acquired several dozen chemical warheads for ballistic missiles. Some experts believe that Syria may have one of the most sophisticated programs in the region.

It is, again, generally believed that the Syrian facilities were built with the assistance of companies from the industrialized world. At least one West German company is known to have provided equipment to the Syrians. Even though the Syrians had chemical weapons in 1973, they have never used chemical agents so far as is known.

Iran appears to only have started acquiring and producing chemical agents in response to the Iraqi use of chemicals in the Gulf war. Iran's first stocks of chemical agents may have come from the Iraqis—drawn out of unexploded Iraqi bombs. However, it now appears that they are developing production facilities for a number of chemical agents. The Iranians may have obtained many of their chemical precursors from West Germany and also the United States. Iran is believed to have used chemical agents on a number of occasions during the Gulf war, but information is scanty.

The Libyans are the most recent addition to the list of countries possessing chemical weapons capabilities. They have built a massive plant at Rabta with the alleged potential to make between 3,600 and 12,000 tons of mustard gas and nerve agent every year. As it is now well known, this facility was built by individuals and companies from the industrialized world, including but not limited to some located in West Germany and Japan. Libya is believed to have mounted gas attacks during the hostilities in Chad, but fortunately these operations do not appear to have inflicted any losses.

There are some concern that other countries in the region may be interested in acquiring chemical agents as well. It has been reported that Libya may have transferred chemical agents to Somalia. At the same time there appears to be concern in the United States that Saudi Arabia may be looking into acquiring chemical weapons. Other countries have also been mentioned as possible recipients of chemical weapons, but such reports were of dubious reliability.

At the present time, chemical weapons are firmly entrenched in the Middle East and additional proliferation is still possible since the pressures to acquire poison gas remains. Unfortunately, as time passes, our ability to bring these developments under control may diminish since countries in the region are acquiring the equipment to make precursor chemicals, making them less vulnerable to export controls from the industrialized world.

The main problem at the moment is the willingness of countries to use chemical weapons. The Iraqis demonstrated that it was possible to use chemical weapons and get away with it. The international reaction to Iraq's flagrant violation of the 1925 Geneva Protocol's banning first use of chemical weapons was muted at best. Moreover, the Iraqis appeared to have demonstrated that chemical weapons have some utility when they are used.

Although many experts believe that the military value of chemical weapons was not as great as is sometimes asserted, it is quite evident that in many countries in the Middle East it is believed that chemical weapons may have become a necessary component of the national arsenal.

Unfortunately, international agreements have proven to be an ineffective barrier. Every country that has used chemical agents in the Middle East is a signatory of the 1925 Geneva Protocol's prohibiting use of chemical weapons.

Senator NUNN. So, all of them have breached the treaty that they had signed.

Mr. CARUS. That is right. Now the Iraqis had the added provision that they had the right of retaliation and they have claimed consistently that Iran used chemicals before they did. So one would have to weigh the evidence there.

The Iranians, on the other hand, did not sign such a provision.

There is reason to at least fear that chemical weapons might be used in future conflicts in the region. The Iraqis have made it quite clear that they will make use of any weapon at their disposal should they so choose, they will not allow international agreements or pressures stand in their way. In addition, we cannot trust the Libyans to show any restraint in the use of chemical weapons.

Although Israel might be the intended target of Arab chemical programs, the Israelis are better able to cope with the threat than any other country in the region. Because of Israelis high sensitivity to casualties and because of the symbolism of poison gas being used to kill Jews, Israel has taken the steps needed to minimize its vulnerability to chemical weapons. It has acquired chemical defenses for soldiers and civilians. It possesses the chemical retaliatory capability and has articulated a retaliatory policy against those who use chemicals against them. Thus, while Israel is justified to be concerned about chemical threats, it is capable of dealing with such a challenge.

Our failure to stop the use of chemical weapons may have even more ominous implications. Countries in the Middle East are moving into biological weapons development. Perhaps 6 of the 10 or 11 countries around the world believed to be developing biological warfare capabilities are in the Middle East. Although recent attention has focused on the Iraqi program, Iran, Egypt, Israel, Libya, and Syria have biological warfare programs.

The willingness of countries in the region to use chemical weapons suggests that they would be willing to employ biological agents as well. Unfortunately, the technical capabilities of these countries is growing, and we should not be surprised to discover that these countries are able to exploit innovations in biotechnology in their programs.

In the Middle East, the acquisition of chemical weapons has gone hand in hand with efforts to obtain weapons systems capable of delivering agents over long distances. Of greatest concern is the proliferation of ballistic missiles, but in some cases aerial refueling programs are also believed to be connected to chemical weapons efforts.

Several countries in the region have programs to put chemical weapons on ballistic missiles. During the mid-1980's the Syrians developed chemical warheads for their SCUD missiles, probably with outside assistance. It is believed that they now have several dozen of these warheads.

Iraq and Iran also are believed to be working on chemical warheads for their ballistic missiles. The Iraqis may be intending to put warheads on their 650-kilometer range Al-Husayn missiles or on their 900-kilometer range Al-Abbas missiles. Either of these missiles would be capable of hitting targets anywhere from Teheran to Tel Aviv.

The Iraqi missile developments have been made possible in part by West German companies reportedly to include a subsidiary of the large defense firm MBB.

The Libyans also are reported to have a program to place chemical warheads on their SCUD missile. In addition, it is believed that the Condor missile being developed jointly by Egypt and Argentina with Iraqi support may be fitted with chemical weapons. It is generally believed that West German assistance, originating with the firm of MBB, plays a critical role in the development of the Condor.

In this context, Libyan efforts to modify their Mirage F-1 and MIG-23 fighters so that they can be refueled in the air must be viewed with considerable alarm. The Libyans have desired, for a considerable period of time, to be able to strike Israel. It is probably not a coincidence that Libyan acquisition of aerial refueling technology, again obtained from a West German firm, is taking place at the same time that the chemical weapons facility at Rabta is being built.

An important part of the bad news about chemical proliferation in the Middle East is the involvement of companies from some of our closest allies. The ability of countries in the Middle East to acquire chemical weapons is largely due to the support provided by companies in the industrialized world, and especially in West Germany, Western Europe, and Japan. Without the technical assistance, equipment, and precursor chemicals provided by experts and companies in the West, it would have not been possible for Iraq, Libya, or Syria to acquire chemical weapons capabilities.

Unfortunately, it appears that this behavior has been tacitly condoned by many of our allies. All too often, Governments have looked the other way when it was evident that their nationals were involved in the traffic in chemical weapons technology. The implicit message that this had given to the Iraqis, for example, is that opposition of the industrialized countries to the spread of chemical weapons is superficial at best.

The worst offenders have probably been the West Germans. At a time when their Government was actively promoting a convention to ban the production of chemical weapons, West German companies were actively involved in the creation of chemical weapons production facilities in Iraq, Libya, and Syria. Although the West Germans will acknowledge that some of their companies may have been profiting from involvement in such activities, their defense has been that their laws do not allow them to interfere in this activity.

However, it has been more than 5 years since the United States first identified the West German companies that helped Iraq build its chemical weapons production facility at Samarra. Yet, the West Germans never made any effort to change their laws to prevent another such incident. If they had wanted to correct the deficiencies in their laws, they had plenty of opportunities. Unfortunately, it is clear that they were not willing to do so. They were content to posture as advocates of chemical weapons bans even as they made possible chemical weapons production in the Middle East.

The vehemence of the West German Government's response to the revelations concerning the involvement of their companies in the construction of the Libyan plant also suggests why it is so difficult to control the proliferation of chemical weapons. The United States had hard evidence. The West Germans knew that we had the evidence, and we knew that they knew we had it. Nevertheless, they were willing to accuse the United States of mounting a smear against their country. It almost seems as if their right to export chemical weapons production capabilities was more important to them than their relations with the United States. Certainly this was an extraordinary event that deserves some attention from analysts of German-American relations.

It appears that the West Germans have finally decided to change their laws to tighten up control of exports. However, we must wait and see if they are really serious about it, and it will be some time before we know for sure that true progress has been made. Unfortunately, even if we make progress there, companies and other individuals from other countries are also involved in the proliferation of chemical weapons.

Rather than adopting sanctions against countries using chemical weapons, the usual reaction is to look the other way.

Mr. Chairman, I will stop at this point. There are some steps that I would support that the United States could take to deal with this problem, and I would be glad to discuss my views in follow-up questions.

Senator NUNN. Thank you, very much, Mr. Carus. Both of you presented very interesting and very helpful testimony; not very encouraging testimony, but that is not what the facts indicate now.

Ms. Harris, you state that the Soviet role in proliferation has been overstated. Could you tell us why you believe that and how you come to that conclusion.

Ms. HARRIS. If you will recall, Mr. Chairman, a few years ago, I think it was in about 1984, there were a number of press reports arguing that the Soviet Union was behind the chemical weapons programs in much of the third world. Jack Anderson, in particular, quoted from what was said to be a CIA report blaming the Soviet Union for much of this problem.

However, if one looks at the information in the public domain, one is forced to conclude that while some countries may have received assistance from the Soviet Union in the past, most of these countries that we are concerned about today have indigenous production programs. They are themselves capable of producing their stockpiles and those programs have been developed with western assistance, not with Soviet assistance.

So, I think that we have made a mistake in the past in blaming the Soviet Union for much of this problem. They are not blameless, but they are not the whole problem, either.

Senator NUNN. Mr. Carus, you have addressed the subject of the Middle East; have the Soviets contributed to the proliferation problem in the Middle East, in your view?

Mr. CARUS. I would share the same opinion that was just expressed. While the Soviets may have taken some unhelpful steps in the past, in the distant past mainly, the current problem has little to do with the Soviet Union. It is almost totally the preserve of Western European and Japanese companies helping indigenous production capabilities.

Senator NUNN. So, those we think of, and rightly so as allies, trading partners, and people interested in the same values we have are really more to blame than the Soviet Union, whom we think of as adversary in terms of proliferation of these kind of weapons in the Middle East. That is what I hear you saying and Ms. Harris is saying that is true around the world.

Ms. HARRIS. Well, I think that we need to bear in mind that our allies in Europe and in a number of other countries have imposed export controls on the chemicals that could be used to make chemical warfare agents. So, they have tried to do something about this problem.

At the same time, they are obviously not enforcing those export controls vigorously enough in certain situations.

But the bottom line on this problem, of course, is that export controls are not going to solve chemical weapons proliferation. If a country really wants to acquire the chemicals and the equipment so that it can produce chemical weapons, it will find a way to get around those export controls. Export control violations have happened in this country; they have happened in other countries.

Sometimes chemical companies do participate in these activities knowingly. In other cases, I believe that they are not aware of the fact that these chemicals or the equipment they are supplying are going to be used for making chemical weapons.

Senator NUNN. I will ask both of you. Do you believe that export controls in this country are worthwhile and meaningful, and second, do you believe that we ought to vigorously pursue tighter export controls and better implementation in our allied countries—countries that are allied with us?

Ms. HARRIS. Again, export controls are of some value, but they are not a solution to the problem. As far as our allies are concerned, we should certainly encourage them to tighten-up their export controls, hire more people to monitor activities, try to enforce their export control laws more vigorously. We cannot force them to do this. All we can do is encourage them to do so.

Mr. CARUS. I would largely share that sentiment. I think that it is important that we have the export controls. I think it is important that we enforce them vigorously. I think it is important that in areas where we see weakness, we strengthen the controls, but as I think we have seen very recently, despite our best efforts, we can have hundreds of tons of a known chemical weapon precursor being shipped to Iran and Iraq. And I suspect that no matter what you do you are going to see additional incidents like that, however strongly you try to enforce the regulations.

However, there is a cost of not having export controls in the sense that it sends a signal that you are tacitly condoning what is going on. At the very least, by enforcing, by setting up laws and enforcing them, you are sending a signal that people might be able to breach our laws, but we do not agree with it, and we are going to punish somebody who takes part in this kind of activity.

Senator NUNN. Let me ask both of you this question, and start with Ms. Harris. What is the value, in your opinion, of bilateral talks between the United States and the Soviet Union, or bilateral agreement on chemical weapons?

Ms. HARRIS. Do you mean a bilateral agreement that would reduce or eliminate their chemical weapons?

Senator NUNN. Yes, something along that line. I am asking whether a bilateral agreement is desirable or whether a multi-national agreement is the only desirable way.

Ms. HARRIS. Well, Mr. Chairman, it depends on where your concerns are. If you are concerned about the Soviet chemical weapons threat, then obviously a bilateral agreement would have some value, whether it reduces Soviet and American stockpiles or eliminates them entirely.

On the other hand, if you are more concerned about the spread of chemical weapons outside NATO and the Warsaw Pact, and the possible use of those weapons in third world military confrontations, then clearly a bilateral U.S.-Soviet agreement would not deal in any way with that problem.

Senator NUNN. What if you are concerned about both?

Ms. HARRIS. Well, then I think you would continue to pursue a ban because a ban would not only deal with the Soviet chemical weapons threat, but also chemical weapons capabilities in the third world.

Senator NUNN. I guess what I am asking is that if we cannot find a way to have a verifiable multi-national ban—and I hope we can, and I noted that you at least believe it is possible, we are going to talk about that some more tomorrow—but if we do not find a way to do that, do you believe that it would be worth pursuing, to go forward with some kind of bilateral agreement that might be able to be monitored in a certain region, more so than a general ban? Or do think that that pursuit would interfere with a general ban and that it would be better to continue to pursue a general ban even though it may be more difficult?

Ms. HARRIS. I think that everyone agrees that verifying a chemical weapons treaty will be extremely difficult. On the other hand, the Reagan Administration in 1984 did put forward a draft chemical weapons treaty in Geneva with the most intrusive verifications provisions we have seen in an arms control agreement. So intrusive, in fact, that everyone said the Soviets would never accept it, and that this was a waste of time.

It was also said, though, that if the Soviets would accept these very intrusive verification provisions that we could have some assurances that countries were adhering to their obligations.

So, I for one would not want to see us redirect our efforts towards something short of the complete elimination of chemical weapons on a global scale. I think that would be a mistake.

Senator NUNN. Let me ask Mr. Carus if he has any observations on that.

Mr. CARUS. Well, I agree that in the long run it would be a good idea to have a total ban, but my own studies on what is going on in the Middle East suggests that it would be very hard to find any country there involved in chemical proliferation that would be willing to sign such a ban. For one thing, the verification procedures would be problematic for all of these countries, all of whom have very tight security regimes.

More to the point, I do not think there is the atmosphere of trust that exists in the region that would allow any of them to rely on a treaty as opposed to their own activity.

Thus, I think that if we rely solely on efforts to have a total ban, it is going to be a long time before a multi-lateral treaty is reached. On the other hand, well, I think we should keep as an ultimate objective. I do believe there are a great many bilateral and perhaps multi-lateral steps we can take in the region that would reduce the chances of recurrences of what we have seen in the last few years, which is to say that through bilateral efforts we can convince countries that it is not a good thing to use chemical weapons, that once we put the lid on that we may be able to get further agreements that in the long term it might be a good idea to eliminate these weapons.

Senator NUNN. Ms. Harris, Mr. Carus does not believe that we are going to be able to get a complete ban. Does that alter your opinion, or do you still believe that we ought to pursue it in spite of the difficulty in the Middle East and perhaps elsewhere?

Ms. HARRIS. Mr. Chairman, our past President, Ronald Reagan, thought that we could get a chemical weapons ban and introduced a treaty that he thought was verifiable and in the U.S. national security interest. Our new President, George Bush, was the individual who tabled that treaty in Geneva. He seems to think that we can get a chemical weapons treaty, and that it is worth pursuing. I would share their assessment of the situation and just add that think this is a good area for U.S.-Soviet cooperation, for the tw countries to use the influence they have with their respective allies, in regions like the Middle East, to encourage those countries that their interests are better served by being parties to this chemical disarmament regime as opposed to being outside of it.

Senator NUNN. Mr. Carus, if the United States and the Soviet Union put pressure on our own friends in the Middle East and elsewhere and we get everybody to sign up, how much compliance would you expect in the Middle East, even if they sign?

Mr. CARUS. Well, it would depend a great deal on the nature of the regime. My own feeling is that a great many of these countries have a long history of being able to hide programs in places where it is difficult for outsiders to find them.

In addition, I find it very unlikely that most of these countries would sign a treaty that allowed for very intrusive inspection, that they might sign a treaty that permits a ban but only if it allows monitoring in very carefully controlled ways as is true with the inspections for nuclear proliferation. So, I just find it very unlikely that under current circumstances, that we can expect a great deal of interest in or active support of a treaty of this type.

Senator NUNN. Let me ask both of you this question. Suppose we get everybody—Ms. Harris, to satisfy your criteria—that we get everybody concerned, to sign up to a treaty, but our own intelligence people, the community comes up and tells us they are only partially—they are not confident, on a scale of 1 to 10, let us say they say they are at the confidence level of about five that this treaty can be verified. Under those conditions—in other words, that substantial element of doubt, substantial margin for cheating by numerous countries in the world. Under those conditions do you think the United States should sign that treaty and then go forward with implementing it from our perspective?

Ms. HARRIS. Well, clearly, Mr. Chairman, the United States should not sign any treaty or implement a treaty that is contrary to our security interests. It is a political judgment as to how much risk we are willing to accept in any arms control agreement—whether it is nuclear, conventional, or chemical. Those are decisions that have to be made by the Executive Branch and by the Senate. I really could not comment on what amount of risk we should be willing to accept.

Senator NUNN. I guess what I am asking—because this is likely to be the question—is whether you would be willing to accept a much higher degree of risk—we will not try to quantify, I cannot quantify it—but a much higher degree of risk in the chemical verification regime than in a nuclear?

Ms. HARRIS. Again, without having some more specific idea of the nature of the risk that we are talking about here, it would be difficult to say whether it would be advisable for the U.S. to enter into such a treaty.

Senator NUNN. Mr. Carus, do you want to comment on that?

Mr. CARUS. I think that what the United States does does not have to depend totally on what is happening in the Middle East. We have a set of concerns in Europe and elsewhere that are of a different character from the ones that exist in the Middle East.

So it is perfectly conceivable for me that the United States could find itself willing to move ahead on a treaty with the Soviet Union, even though we recognize that most of the countries in the area like the Middle East would not join onto it. That just suggests to me that a chemical weapons ban cannot be the only avenue of diplomacy that the United States follows. But it may solve certain other problems that the U.S has outside of the region.

Senator NUNN. I thank both of you for being here. It has been very interesting and helpful. We hope to stay in touch with you.

I want to express my appreciation before we close today's hearings to Ambassador Dalrymple of the Australian Embassy here, and the Australian Government for providing a submission for the record on the policy of the Australian Government regarding chemical weapons and their international initiative to stop the spread of chemical weapons. Without objection, we will have this as part of the record.[1] I read it and I find it very gratifying that the Australian Government has gotten out in front in this area, and is not only a leader but helping to stimulate others. So we are grateful to the Embassy here and the Ambassador for submitting this for our record. And I commend it to any who are interested.

Tomorrow we will have hearings again in this room at 9:30. We will have two panels. One panel, Mr. Brad Roberts, CSIS, and Mr. Frank Gaffney, Director of the Center for Security Policy. Panel number two, Major General William Burns, Director, U.S. Arms Control and Disarmament Agency, Mr. Allen Holmes, Assistant Secretary for Politico Military Affairs, Department of State, and Major General Arnold Schlossberg, Junior, Principal Deputy Assistant Secretary of Department of State.

I thank all of the witnesses for being here.

The hearing will be adjourned until tomorrow.

[Whereupon, at 1:25 p.m., the Committee recessed to reconvene on Friday, February 10, 1989.]

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[1] See Exhibit No. 2 on p. 530.

GLOBAL SPREAD OF CHEMICAL AND BIOLOGICAL WEAPONS: ASSESSING CHALLENGES AND RESPONSES

FRIDAY, FEBRUARY 10, 1989

U.S. SENATE,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
AND ITS
PERMANENT SUBCOMMITTEE ON INVESTIGATIONS,
Washington, DC.

The Committee and the Subcommittee met, pursuant to notice, at 9:40 a.m., in room SD-342, Dirksen Senate Office Building, Hon. John Glenn, Chairman of the Committee, presiding.

Present: Senators Glenn, Nunn, Levin, Lieberman, and Kohl.

Senator NUNN. The Committee will come to order.

Senator Glenn, Chairman of the full Committee, has asked that I chair this morning; we will be swapping it back and forth as we did yesterday. But this is a joint hearing between the Permanent Subcommittee on Investigations and the full Committee.

We had a good day of hearings yesterday. We heard some very sobering testimony about the extent of the proliferation problems and the horrors of actual use of these weapons. Today we will focus on possible solutions, beginning with the ongoing efforts in Geneva to negotiate an international treaty to ban chemical weapons globally.

We have a number of witnesses today.

Our first panel includes Mr. Brad Roberts, a Fellow at the Center for Strategic and International Studies, CSIS. Mr. Roberts, we are delighted to have you. Frank Gaffney, who is a familiar face to all of us—we knew him even before he had that stubble on his chin—is the Director of the Center for Security Policy and formerly a Deputy Assistant Secretary of Defense during the Reagan Administration.

We will then have a second panel composed of General Williams Burns, Director of the Arms Control and Disarmament Agency; Mr. Allen Holmes, Assistant Secretary of State for Politico-Military Affairs, as well as his principal deputy, Major General Arnold Schlossberg, Jr.

We will begin this morning with Mr. Roberts and then Mr. Gaffney, and I suggest that we hear from both our witnesses as a panel, and then we will have questions for each of you.

Mr. Roberts?

TESTIMONY OF BRAD ROBERTS, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES, WASHINGTON, DC

Mr. Roberts. Thank you for the opportunity to contribute to the work of these committees to define the problems confronting the United States arising from the proliferation and use of chemical weapons. I have prepared a statement for submission for the record [1] and would like to make some opening remarks.

As chemical warfare and chemical arms control have moved from the periphery closer to the center of U.S. policy concerns over the last few years, two basic perspectives have emerged. One holds that chemical arms control is a proximate goal—that agreement is likely in Geneva in a year or two, given the high personal commitment of George Bush and the more conciliatory policies of Mikhail Gorbachev. The other perspective holds that chemical arms control is a pipe dream, rendered impossible by the verification obstacle, and that in any case the proliferation of chemical weapons has driven the problem beyond negotiable solutions.

Both perspectives, in my view, are oversimplifications. In fact, our thinking about chemical arms control has not kept pace with events of recent years. We are now in danger of letting those events stampede our thinking.

What has changed since current U.S. policy was formalized in the draft treaty of 1984?

One principal change is the rapid proliferation of chemical weapons in this decade. How bad is the problem? We entered the 1980's with half a dozen or fewer chemically-armed states; we will enter the 1990's with nearly two dozen.

The mere quantitative accumulation of chemical arms is itself to be condemned. More important, though, it matters tremendously who is acquiring chemical weapons. Chemical arms are proliferating to militarily unstable regions where the temptation to attack preemptively an opponent's chemical arsenal or to escalate to counter-city strategic warfare will be highly destabilizing.

The parallel proliferation of high-technology delivery systems—principally missiles—only aggravates this problem. Chemical arms are also being acquired by revanchist states with a well-established predilection for the use of military force domestically and internationally. Some are known sponsors of terrorism who have shown no compunction about opening their armories to the lunatic fringe.

Furthermore chemical proliferation seems highly likely to propel the proliferation of biological weapons. Indeed recently, we have seen reports of ten or more states that have acquired quantities of infective material inconsistent with any perceived peaceful purposes. Too little attention has been focused on this latter problem. We have generally failed to grasp the more clearly massively destructive quality of biological weapons and the profound consequences of an unravelling of the existing arms control regime in that area.

Too much can be made of the spectre of chemical proliferation, however. Proliferation is a two-step process, with separate decisions to acquire and then use chemical weapons. The problem we face today is that the political and military barriers to both decisions are less effective than in the past. But they have not yet become irrelevant. Chemical weapons may be relatively cheap and easy to produce, but they are still messy and dangerous to use. They also invite retaliation by an opponent, suggesting at least the possibility that chemical deterrence regimes between opponents may emerge, rendering chemical warfare less rather than more likely in the long term. Furthermore, a legal and ethical international prohibition against chemical weapons still exists; that it does not work as well as we might wish does not mean that it is without weight.

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[1] See p. 296.

How should chemical weapons proliferation shape our thinking about the arms control process? I would say in three ways. First, in 1984 it was widely assumed that a bilateral U.S.-Soviet deal in this area could move us 95 percent of the way toward a global ban, as it had in the biological area in the early 1970's. We must understand that what may suffice for U.S.-Soviet agreement may not be an adequate basis for a multilateral global agreement—our concepts of verification, compliance and deterrence must encompass this larger reality.

Second, we must be creative in formulating the entry-into-force provisions of a treaty. Under the tentative agreement, 60 states must sign on to a chemical weapons convention before it enters into force. It matters tremendously which 60 states sign on. Ways must be found to leverage agreement and compliance by problem states.

Our experience with the piecemeal application of instructions of state pressure engenders a certain pessimism about this. On the other hand, it is possible that a chemical weapons convention may provide the kind of framework necessary for a serious international effort to craft a strategy combining international political pressure, economic sanctions, and security assistance suitable to the behavior and vulnerabilities of individual problem states.

Third, we must begin to think about a disarmament regime that is not global and to assess whether it is in the interest of the United States—or, for that matter, the Soviet Union—to disarm chemically when their allies or client states face a high risk of chemical war. This question is not posed rhetorically.

The second fundamental change since the draft treaty was tabled in 1984 is in the area of verification. Chemical arms control has been a subject of international negotiation since the first Hague Conference of 1899–90 years. Effective disarmament has been stymied repeatedly by the impossibility of knowing what is going on in every facility in the world capable of producing chemical weapons. Since 1984, a great deal has been learned about intrusive verifications.

The chemical working group of the Conference on Disarmament has made commendable progress in delineating verification measures. Their work has built on the quite radical U.S. proposal for inspections by an international inspectorate anywhere, any time, within 24 hours of their demand. But as they have defined what is doable in this area, they have defined the flip side as well—what is impossible. The technology of the production, storage and manipulation of toxic substances has changed in the last decade or two such that illicit chemical agent production will not be detectable even with only 24 hours' notice.

The negotiation and ratification of the INF Treaty has provided valuable additional insight into intrusive verification. Some of it bodes ill for our ability to live with the proposal we have made in the chemical area—the United States proved unwilling in the INF area to codify the level of intrusiveness of its own facilities embodied in the 1984 draft chemical treaty.

But some of it bodes well. In general, the INF verification experience has underscored that it is not important to detect all cheating. The inspection regime reassures the United States that a high level of Soviet cheating is not occurring. Certain cheating that is not quite so easily detectable is deterred by surprise challenge inspections. Other cheating is deemed largely irrelevant—the risk of a few hidden SS-20s will be even less important in the outyears when their reliability will be highly dubious.

The United States has decided to live with the risks of chemical cheating at the margins in the INF area and to pay a price in terms of the credibility of NATO's flexible response strategy, in exchange for a broader arms control goal that reduces international tensions and enhances alliance solidarity. Similar trade-offs will be required in the chemical area.

The terms of the debate about U.S. policy toward chemical weapons must begin to reflect these various factors. Advocates of an arms control- solution to the chemical problem ought begin to assess realistically the merits of a disarmament solution that is less than perfect—where some chemical weapons and a risk of treaty breakout remain. Advocates of a military solution to the problem ought begin to assess realistically the problems of sustaining chemical deterrence in a proliferating world. This would help to focus more clearly the real choices confronting the United States.

Could the United States live with a future of competitive chemical armament? We must answer a reluctant "yes". History suggests that chemical deterrence works, albeit imperfectly. Until the recent past, stable deterrence has seemed workable at relatively low levels of armament. But how will deterrence work in a world of many chemically armed states? How would the United States assist its allies and friends to meet a burgeoning threat of chemical warfare? How could it cope with a Soviet Union committed to major chemical build-up?

Those who prefer this military solution have not done enough to define the future costs of a grudging acceptance of chemical proliferation. Those costs would be political—we could certain anticipate more acrimonious domestic and international debate about binary production and stockpile management as well as a global debate were the United States actively to assist other states to acquire retaliatory chemical arsenals. Those costs would also be economic—chemical defense and offensive weapons could make escalating budgetary claims in an area of declining defense resources. They would also be military—the growing ability and compulsion to strike deep in time of war in Europe will require revisions to NATO's chemical deterrence strategy; crisis stability in areas outside of Europe will be eroded by chemical proliferation; there is little the United States or its allies can do to cope with the threat of biological attack.

In short, these political, economic and military future costs cannot be accepted lightly.

Could we live, on the other hand, with imperfect disarmament? That depends. The United States clearly could not live with deep doubts about the compliance of the Soviet Union.

The United States could probably disarm comfortably if a few renegade states in remote corners of the globe retain chemical weapons—I do not believe it necessary for the United States to retain a chemical capability simply to retaliate against chemical attack on U.S. forces in conflicts in the Third World.

But if chemical war remains a serious prospect in either the Middle East or Northeast Asia, U.S. chemical disarmament may be imprudent. There are costs associated with this imperfect disarmament option as well, namely, in terms of the risk of treaty breakout. But a U.S. safeguards program that provided for some limited U.S. ability to generate a small quantity of chemical weapons on short notice in time of war could be a useful hedge against this risk.

In closing, a policy agenda to move the chemical problem closer to solution ought to incorporate the following principal elements.

One, the United States must decide what it can and cannot live with in terms of verification and compliance provisions—what kind of cheating matters to us, and what costs are we willing to pay to detect it? Unfortunately, the United States has not taken the lead in the development of expertise on chemical arms control verification. It could be more willing than it has been to invest in the generation of the kind of expertise without which the hard conceptual work of effective arms control cannot proceed.

Second, more steps must be taken to slow the proliferation of chemical arms. The United States should move forward with its commitment at the recent conference in Paris to support measures to enhance the authority of the United Nations to investigate allegations of chemical use. The work of the Australia group to constrain the seller of chemicals must be supplemented with more concerted efforts to exert political pressure on the buyer. More can be done to constrain access to the trade of equipment and technology. Prosecution of corporate complicity should proceed vigorously wherever possible.

Third, the United States must do more to capitalize on the "new thinking" of the Soviet Union toward this problem. The foundations have been set in place for a more effective partnership on the proliferation and verification problems.

There is an important related question of the place of U.S. chemical weapons in efforts to constrain proliferation and arms control. I do not believe that unilateral disarmament is productive of either goal, because U.S. chemical weapons and stockpile modernization have very little to do with the proliferation of chemical weapons and because unilateral disarmament would seriously diminish the incentives of the Soviets and others to negotiate an agreement that meets U.S. criteria of effectiveness. The United States and its allies should not relinquish the important deterrent effect of U.S. chemical weapons for the largely cosmetic benefits of unilateral disarmament.

I would like to close with one last reference to the INF experience. A chemical arms control agreement is possible today. But like the INF agreement sketched out during the walk in the woods, it is an agreement to which the United States and many other countries would not be willing to say yes. If an INF-type breakthrough is possible—one that truly disarms and renders undetectable cheating irrelevant—the United States should be willing to live with some of the risks. Such a breakthrough requires the creativity and good will of the partners to the negotiations in Geneva; it also requires the leadership of the United States.

Thank you.

Senator NUNN. Thank you very much, Mr. Roberts.

Mr. Gaffney?

TESTIMONY OF FRANK J. GAFFNEY, JR., DIRECTOR, CENTER FOR SECURITY POLICY

Mr. GAFFNEY. Mr. Chairman, thank you for your warm and personal welcome. I have to respond by saying that when you first knew me, not only did I not have this stubble on my face—I had more on the top of my head. And I hold you partly responsible for the movement in that direction.

Senator NUNN. It is mutual. I have had the same problem.

Mr. GAFFNEY. It is a distinct pleasure to appear before this Committee. I, too, have a prepared statement,[1] which I have submitted, and I would only highlight a couple of the points.

Senator NUNN. Without objection, your full statement will be included in the record, and also, Mr. Roberts, your full statement will be included.

Mr. GAFFNEY. If I may, Mr. Chairman, there are several other inserts which I would like, if the Committee is willing to do so, to have inserted in the record at appropriate points in the testimony.

Senator NUNN. Fine.

Mr. GAFFNEY. I would also like to say as a former professional staff member of the United States Senate that I have found it a distinct pleasure to work with your staff in preparation for this hearing. I think that they conducted themselves in ways that I was very rarely able to do in producing an orderly hearing, and I hope the results of our testimony will reflect that.

Senator NUNN. Well, you have had a great deal of experience here and a long number of years and I am sure, coming from you, that is particularly gratifying to our staff. So I thank you on their behalf.

Mr. GAFFNEY. It is heartfelt, sir.

I will not go into the background of how it is that the United States came to resume chemical weapons production. Senator Nunn, you and Senator Glenn, who had an absolutely pivotal role, along with Senator Tower and Senator Jackson, in bringing us back from the kind of unilateral disarmament that we were experiencing during much of the period when we had a unilateral moratorium on production, know that saga at least as well as I. I think that you are to be commended for the vision and courage in the face of virtually universal condemnation in the press and elsewhere for taking the hard choices and important steps that brought us back into a modest but vital production program for CW.

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[1] See p. 337.

It is also important, I think, for what I am going to say shortly that then Vice President of the United States, George Bush's, pivotal role in casting, it is my recollection, three different tie-breaking votes in the United States Senate to get that program under way, was both an important turning point for the program and obviously an important psychological moment for the then Vice President and now President.

Senator NUNN. I think that was the vote that caused his mother to get upset with him, if I recall.

Mr. GAFFNEY. I have been told she has never forgiven him.

And it does, I think, in fact make some of the points that I want to address about the wisdom of a chemical weapons ban to which he has expressly committed himself as recently as last night, in his remarks to the Joint Session, all the more germane.

Instead of going over the background, I would like to spend a few minutes talking about what I think are the lessons of the Libya chemical weapons plant for the notions that are currently very much in play about a global verifiable chemical weapons ban.

I think it is but the most recent, if among one of the more frightening examples, of an emerging CW program in the developing world. I gather than CIA Director Webster, in both open and closed testimony, addressed just how significant this phenomenon is, how widespread it is. But I think it is useful, given what we can say in the public domain about the Libyan plant, to use it as sort of an illustrative example of the larger problems that such developments cause in an effort to ban chemical weapons.

I would like to make the following points.

First, the Libyan plant illustrates the point that there is simply no certain way to distinguish between legitimate facilities producing a range of chemical products for civilian use—for example, fertilizers, pesticides, pharmaceuticals and so on—and those producing weapons.

If there is any doubt on that point, I would submit that the episode at Bhopal, India, which no one would suggest involved a facility actually engaged in chemical warfare, nonetheless shows how deadly, how devastating, the products of even civil chemical activities can be.

Secondly, as a related point, the industrialized world's companies, banks, and yes, even governments, are knowingly or not, fostering the spread throughout the developing world of indigenous infrastructures with the inherent capability to produce chemical weapons. Again, the CIA Director's testimony yesterday, I think, puts that into appallingly stark light.

It should be deeply troubling to all of us that the sources of chemical technology appear to be either indifferent to the potential for misuse—as the West German firms involved in Rabta evidently are—or that they are willing to overlook it in the interest of making a sale.

Thirdly, even if one were able somehow—and I entirely agree with Brad about the difficulties of doing so—but even if one were able somehow to determine on a given day, or even over a given period of time, that a plant was engaged in the manufacture simply of commercial chemical products, there is no known means of insuring that its equipment will not be put to CW-related uses shortly thereafter.

It was for precisely this reason, as I understand it, that the United States Government properly declined when Moammar Qadaffi said, in the heat of the debate over the Rabta plant, that he would allow us to have an onsite inspection of the Rabta facility.

What is more, gentlemen, the Rabta plant is if anything more obviously associated with military activities than one would ever expect to observe at facilities that were either engaged in covert manufacture of chemical weapons or being held in reserve against the day when such manufacture was deemed by the country involved to be necessary.

Its reported 40-foot earthen wall, rings of air defenses and other security measures are fairly compelling, albeit circumstantial, evidence of the purposes to which this plant will be put.

It has nevertheless proved remarkably difficult to obtain allied—to say nothing of neutrals'—endorsements of the U.S. assessment of the Rabta complex. One can ponder why that is so. Perhaps it is that the governments in question are unpersuaded because their finding, in line with our own, would be inconvenient for their relations with the Libyans, possibly exposing them to terrorism against their governments or citizens.

Or it may be that the acknowledgment of the facts would oblige them to take some responsibility for resolving the problem—for example, sanctions, or perhaps an endorsement of military action.

We have seen this in past episodes of Libyan terrorism, and I think we should understand that it is a given when it comes to future actions related to CW.

Whatever the reason, the fact is that even in the absence of a treaty banning production of chemical weapons, it is excruciatingly difficult to get international agreement that a given activity is related to chemical weapons manufacture. I can only say that we must expect, should a treaty outlawing chemical weapons ever be achieved, that persuading others that a given country, for example, the Soviet Union, is violating that agreement will become even more difficult.

These considerations, in my view, serve to make two points. First, chemical weapons proliferation is a fact of life in the modern world. Such weapons can and are being manufactured cheaply. They do not require expensive, dedicated facilities as do, say, nuclear weapons, nor do they require great technical sophistication to make.

As a result, as you see on the board here, countries around the world are availing themselves of the ability, actual or potential, to produce lethal chemical agents.

A second point is that the aforementioned factors make any effort to respond to CW proliferation by negotiating a ban on the production and stockpiling of chemical weapons dangerously futile. It is simply not possible today to prevent countries with modern commercial chemical industries from also having thereby the ability to produce chemical weapons. It is just not possible.

There is no verification system today or in prospect that will unfailingly detect lethal chemical agent production and storage.

What is more, I must tell you that one of the last briefings I had before I left the Pentagon in 1987 alarmed me greatly—and if you have not had it, I encourage you to get it from the small, vestigial program we have, that worries about biological defenses. The briefers showed me a photograph of a device which looked somewhat like an overgrown coffee percolator. They pointed to a closet in my office and said it could fit in there. It was representative of contemporary, commercially available technology that can be used to produce biological, toxin, and yes, even chemical agents. No conceivable verification system in the world could have detected its presence—even if it were in my office provided the device was secured in the closet—let alone if an inspector were outside the building or outside the territory of the United States.

This is a fact of life, and I think it is going to infinitely compound the present problems, because what signatures are today available to us that offer some hope in some circumstances—usually, if the country involved has screwed up—of having some indication, circumstantial, almost certainly, but some indication that a chemical weapons activity is underway.

These considerations prompted every involved agency of the United States Government in 1987 to recommend that the formal U.S. position seeking a global ban on chemical weapons be changed. Now, it frankly would be hard to overstate the significance of this——

Senator NUNN. Would you mind telling us just which agencies those were?

Mr. GAFFNEY. Yes, sir. I am struck by the fact that Mr. Gordon of the New York Times this morning had already had a chance to query some of the agencies involved, and I think it is highly appropriate that the Permanent Subcommittee on Investigations be taking this testimony, because I strongly urge you to have an investigation of which agencies were involved.

My information comes from a conversation I had with a senior official of the National Security Council at the time—a man who knew exactly where things stood, exactly where the various agencies' positions were. It was my understanding at the time that every involved agency including not only the one I represented, the Office of the Secretary of Defense, but the Joint Chiefs of Staff, the Arms Control and Disarmament Agency, the State Department, its several bureaus, I think, or speaking with one voice, and the National Security Council itself, had arrived—reluctantly, but nonetheless had arrived—at a recommendation that we must change our position in favor of an outright aggressive pursuit of a chemical weapons ban.

Now, if I may just develop for a moment, Mr. Chairman, some of the points that are relevant to this, I think it will help put that in context.

Senator NUNN. Go ahead.

Mr. GAFFNEY. It is important to note that Secretary of State Shultz committed the United States Government to tabling a treaty seeking a ban on chemical weapons without, to anybody's knowledge, including as I understand it the National Security Adviser's knowledge and permission, or any formal coordination on the part of the United States Government.

Consequently, in January 1984, when that position was announced in Stockholm, it set in train a feverish effort to try to draft a treaty that would be consistent with our interests. And over the next several months, a concerted effort was, in fact, made to find a treaty that would, if not be verifiable under all circumstances, at least have some prospect of minimizing the serious risks associated with an unverifiable treaty.

This gave rise, as you all know, to a proposed treaty which the United States did table in April of 1984—in fact, it was tabled personally by Vice President George Bush—in Geneva, before the Conference on Disarmament. It had as one of its features the provision that Brad mentioned, an "anywhere, any time" provision. I can tell you as one who was involved with the agency that was the principal sponsor of that language that there was no illusion, certainly, in our department and, I think, in any other of the Government, that even if that proposal were to be universally accepted, the treaty would, in fact, be fully verifiable.

But in short, in haste—in fact, under some duress—the Government did its best to put forward a position. It was, however, I think, a reflection of the perceived infeasibility of a ban on chemical weapons—and a recognition that real risks would accrue to the United States were it to enter into an unverifiable one—that prompted the 1987 interagency consensus in favor of a change of CW arms control policy.

I was told in the fall of 1987—and I reaffirmed it within the past two weeks—that that position would, in fact, have been recommended to the President and presumably accepted by him but for the intervention of representatives of then Vice President Bush, who objected to the proposed change.

As a result, instead of putting aside the seeking or imminent attainment of a chemical weapons ban, I fear we are now, under the new Bush Administration, moving forward inexorably toward such a ban, in part thanks to the impetus provided by the recent International Conference in Paris.

My view is, as I have mentioned, that the result of such negotiations will be neither "global" nor "verifiable". On the global point, Brad has already mentioned that we are prepared to accept a treaty as long as no more than 60 countries have signed up to it. Now, it is inconceivable to me on what basis that can be described as a "global" ban.

While it is certainly true that we must be concerned about which of the 60 countries will be signatories, it inevitably must be asked what if nations suspected of having CW are not among the signatories; would we still sign up to the treaty? What if non-signatories were not assessed to have a CW capability at the time that we signed up to such a treaty, but were judged subsequently to acquire it? Would we renounce the treaty?

I find it absolutely inconceivable that we would do so. These are the kinds of questions that I hope the Senate will consider before we get any further down this road—not once a completed treaty is presented for ratification.

As to the verifiability point, I have already addressed what I think are show-stoppers in terms of verification. Let me just address for a moment a process point.

Senator NUNN. May I interject one question here? I understand the testimony about the agencies and their position against the position of our Government to ban all chemical weapons. Did they have a substitute course of action?

Mr. GAFFNEY. I am sorry—"they" being——

Senator NUNN. The agencies.

Mr. GAFFNEY. It is my recollection, Senator—and I hope this will come out in further testimony—it is my recollection that the agencies differed on what should be done instead, and the Government being what it is, you take one step at a time, and when you can get agreement on one point, you bank it and then you go on to the next flail. But I do not believe that a decision had been worked out or a formal position had been arrived at as an alternative, except that I think that there was an understanding that we were going to strive for more modest limitations, limitations that would not require us unilaterally to disarm, in lieu of the comprehensive ban.

Senator NUNN. But I guess what I am getting at is, if each agency said, yes, we should do away with our existing position to ban all chemical weapons, and each agency had their own alternative, was the question posed to the agencies: If your alternative does not go, or if there is no other alternative on which we can gain consensus, do you then still favor eliminating the present position? It seems to me that is a different question. Do you know the——

Mr. GAFFNEY. I am not sure I know the answer to that, Senator, but I encourage you to explore this vigorously.

Senator NUNN. Okay, thank you.

Mr. GAFFNEY. I will just make two points on the process of verification. I think that anyone who has watched the treaty-negotiating business, not just in the CW area, but in any area, will appreciate that it is essentially two steps. The first step is the process whereby the treaty is negotiated. This is what I call the "lowest common denominator" approach to verification. Sometimes, we represent the low position; more often, it has been the Soviets or other countries who are resistant of intrusive verification measures.

But whoever it is, at the end of the day, what comes out of the negotiations is whatever verification scheme everyone can agree to. Now, that may seem self-evident, but it should be understood that almost always, that is the function or result of a whittling away of more intrusive, more demanding verification schemes.

Then comes the process of over-selling the treaty's verification merits. Executive Branch officials routinely troop to the Senate to tell them that the treaty is not perfect, but it is "effectively" verifiable, or it is "sufficiently," "adequately" or "reasonably" verifiable.

In any event, that is the best they could get, and the Senate is put more often than not in the position of taking it or leaving it.

And I, frankly, contrast my own sense of the lessons of the INF Treaty with those Brad has advanced. I fear that all too often the United States Senate is unwilling to challenge this two-step process. In fact, I believe the INF Treaty, an agreement with serious and documented verification shortcomings, was not seriously challenged on those grounds during its consideration by the Senate, as a case in point.

It will be interesting to see what you gentlemen decide to do with a START treaty or one of these others, which will have infinitely more difficult verification problems.

Regrettably, therefore, I must conclude that we have a serious problem on our hands vis-a-vis this treaty. But I must also tell you that I think that problem is likely to be compounded by the fact that there is no reason whatsoever for believing that collective enforcement of compliance will occur.

Indeed, the conferees at the Paris session found themselves unable even to mention by name countries which were known to have used chemical weapons in violation of the existing arms control regime affecting these awful systems. It is hard to imagine, Senators, I would submit, that the nations of the world will be more willing to take punitive measures when the result of a violation is not the wholesale murder of innocent civilians, brutally documented by television, but simply the existence of a building suspected of manufacturing illegal agents.

I will not belabor the point that is in my testimony, but I strongly encourage members to look at it, about the parallels that I see between the situation we are about to get into if the President has his way on banning chemical weapons and the situation we are currently in with respect to the worldwide global and wholly unverifiable ban on biological weapons.

I would just make one specific point. We have today not only no offensive biological weapons program in this country; we have no biological defensive program to speak of in this country.

As a practical matter, I am afraid we will find precisely the same thing developing if we decide to ban chemical weapons. The United States would in all likelihood succumb over time to the temptation to dispense with what modest CW training and equipping we currently do—that is to say, the defensive side of the house. Senator Nunn, I know you have participated, and perhaps Senator Glenn as well, in hearings before the Armed Services Committee, in which the woeful state we are talking about now—in the face of a massive Soviet chemical weapons capability, to say nothing of this proliferation that exists in the U.S. military. And by and large, the U.S. military in terms of defenses against chemical weapons attack is better-prepared than anybody else in the alliance. This is a situation that almost certainly will get worse if our military is reasonably persuaded that the threat of chemical weapons has disappeared.

Similarly, I suspect Members of the Congress will be disinclined to spend precious resources on defensive equipment when the threat has supposedly gone away.

So finally and very quickly, Mr. Chairman, I would make several recommendations.

One, I think it is imperative that the United States Government forget about banning chemical weapons. Ironically, I believe even today, those in the Administration responsible for fulfilling President Bush's oft-stated commitment to such a ban know better.

Some have privately expressed to me their view that the ban is ill-advised. Their hope is apparently that eventually they will be able to disabuse the President of his illusions.

In the meantime, at least in the absence of the kind of serious Congressional scrutiny I encourage you to undertake, these officials appear unwilling to admit publicly that "the emperor has no clothes." As a result, as I have said, the United States lurches inexorably onward toward a dangerous and unverifiable chemical weapons ban. I believe that the United States cannot afford to indulge in such hypocrisy. We cannot support an objective whose accomplishment we know would be highly dangerous. I think as a practical matter, dragging our feet in the negotiations in the hope that we will be able to hang them up on some technical detail of verification or another is neither responsible nor likely to succeed.

Could I just say that I am struck, Mr. Chairman, by the parallels between the position the United States Government has gotten itself into on CW and that related to a comprehensive test ban. In both cases, responsible officials know—and I think many Members of the Congress know—that the goal we are committed to strive for cannot be achieved in a manner consistent with our national interests.

As John Kennedy once said about a comprehensive test ban, it is not merely difficult, it is impossible of accomplishment. Such honesty and leadership is needed on the CW front now.

Very quickly, I think that the Congress can play an instrumental role in all of this by demanding honest appraisals of the prospect for a global verifiable ban for Administration spokesmen. I think Brad has correctly pointed to a number of the areas in which honesty and insight is required. I think that the halting of the United States' headlong pursuit of a dangerous CW ban and challenging the wishful thinking that motivates it will require no less courage than you gentlemen exhibited in approving the binary program some years ago; and yet the risks to the United States and allied security of doing otherwise are no less great than those that prompted the prudent earlier action.

There are steps that we can and should take to stop chemical weapons proliferation, in my view. I support the kinds of ideas that have been advocated by Senators Pell, Dole and Helms in offering sanctions, economic sanctions, that would affect, hopefully, the transfer to those who do not have CW potential now, obvious CW offensive capabilities.

If we are to do this, we obviously must adhere to a consistent standard ourselves. And one of the papers, Mr. Chairman, which I would like to offer for your consideration and inclusion in the record relates to a decision taken in the latter part of the Reagan Administration, permitting two United States firms, Honeywell and Bailey Controls, to provide the Soviet Union in a joint venture arrangement with advanced automated control equipment that will, in my view, facilitate Soviet efforts—if they choose to use them for this purpose—to manufacture chemical and possibly even nuclear weapons more efficiently than they can do today.

I think we ought to go after the financing of chemical-related activities. Clearly, governments to some extent, certainly banks, have been up to their necks in helping countries acquire these capabilities on credit, I think, as well as technically. And I think it is clearly the case that a sufficient menace is posed by the Libyan plant to warrant physical destruction of the site if the other techniques prove ineffective.

Finally, Mr. Chairman, I would just reemphasize the obvious theme of this——

Senator NUNN. Could I ask you there how you distinguish among Libya and Syria and Iraq—what would make you go after the Libyan site but not Syria and Iraq and perhaps even Iran? Is there a difference?

Mr. GAFFNEY. Well, I am not sure that there is, Senator. I think in the sense that one plant has presumably not yet come on line, and the physical destruction of it could conceivably have an effect upon the actual capabilities of the country, at least for a period, you might have an effect in taking out that plant that you would not have in other countries where the plants have already, obviously, made some considerable headway in producing stocks of chemical weapons.

Chairman GLENN. But you favor, though, taking out plants wherever found?

Mr. GAFFNEY. Well, I certainly think it ought not be precluded as an option, Senator—I think particularly where countries have made no bones about their active support for international terrorism.

Chairman GLENN. Would that include the Soviet Union?

Mr. GAFFNEY. I think obviously, the choice of taking out a chemical plant there—if we could—would be a harder one in that case, and I doubt would be——

Senator NUNN. I would say that would be tough decision.

Chairman GLENN. Yes, that would be a harder decision. [Laughter.]

Mr. GAFFNEY. Yes, that would be a harder decision—and would require considerable thought.

I would just conclude by saying that whatever else we do, I entreat this Committee and other committees of the Senate to ensure that we do maintain an effective chemical deterrent by retaining a modest, but credible, retaliatory capability.

I am struck by the kind of rhetoric that the President used last night about civilization and human decency. This is not an exercise in noblesse oblige. This is the vital security interests of the United States, and I think they are too important to be readily or cavalierly cast aside in favor of an illusory chemical weapons ban.

I thank you, sir.

Senator NUNN. Thank you, Mr. Gaffney.

Mr. Roberts, let me just ask my question, and I have already asked a couple, so I am only going to ask this one on the first round. Is there anything that Mr. Gaffney said to which you would take exception?

Mr. ROBERTS. Well, there might be a few things I would take exception to.

Senator NUNN. Just a couple, two or three—and I will ask him the same question about your testimony. That is my question, because you are both experts in this area and you have thought a lot about it.

Mr. ROBERTS. I find two principal areas of difference. First, I am not convinced that it matters that we know what is going on in every corner of every facility capable of producing toxic chemical agents. After all, in the case of Libya, it really does not matter if 6 days of the week Qadaffi is producing aspirin, and on the seventh, he is tucking away a little toxic Sarin, or something.

What matters is that that Sarin is being weaponized—or, it would matter, were it being weaponized, stockpiled, transported to a storage facility, if troops were being trained in its use. And actually, all of that is not illegal. It would be the first use in time of war that would actually be the step to what is illegal.

I just do not think that it matters—what we are after in verifying a chemical agreement is verifying that states are not creating the ability to wage chemical warfare. That is different from knowing that surreptitious stockpiles of stocks are being accumulated here and there.

Second, I agree with Frank on the view that we need to look at trade-offs, and I have tried to sketch out some of those trade-offs. I come down a little differently. I am not sure it matters that chemical weapons have proliferated to certain parts of the world. In terms of the interest of the United States, our principal interest would have to be the disarmament of the Soviet Union—our principal interest in chemical war is in Europe, let us be frank. We do not really much care about chemical war in other parts of the world, except in a Korean conflict. Our concern is NATO; our concern is chemical deterrence in NATO, and I think when we slice the issues that way, the trade-offs look a little different.

Senator NUNN. When you say we do not care, you do not mean we do not have any concern, but you are saying it is not directly affecting our security; is that what you are saying?

Mr. ROBERTS. Correct. I think we definitely have a moral view, and we have a political concern, and we should stand against the proliferation of chemical weapons because it is destabilizing, and their use is inhumane. But that is a separate question from the calculations that we must make about whether it is in our interest or not to forge a chemical weapons convention. We need to separate out those 2 issues.

Senator NUNN. Are there any other points that you would note?

Mr. ROBERTS. Two more, if I may. One relates to violations. If we were to achieve an agreement we would certainly have cases of suspected violations and of violations but I do not think that past is necessarily prologue with regard to dealing with these violations. I do not share Frank's skepticism that the international community could not do something to impose costs on transgressors. Frank is right to hammer on the unwillingness of the Allies and of many suppliers in the Third World to be concerned about what has been going on in Libya. But I think it has also been overstated. I think that by and large, people—including decisionmakers in governments around the world are concerned about the process of chemical proliferation. I think that the reasons states do not speak up publicly about U.S. allegations is that they do not want to be seen to be playing into the hands of a conservative administration in Washington. I think it would be a lot easier for the nonaligned, and unfortunately, for the European Allies, to stand up on behalf of some international organization of some kind. The politics of violations would change in a multilateral agreement.

The second point relates to the focus on the role that Western industries have played in making this proliferation problem worse over the last few years. This focus is appropriate. But I think we have to understand that corporate complicity is not the source of the problem.

Qadaffi has a fancy, brand new chemical plant there in Libya. He does not need anything like that to produce chemical weapons. He does not need access to the finest, newest Western technology. That kind of technology exists in any petrochemical plant, in any fertilizer plant. We should prosecute Western complicity where it exists. We, the United States, should have effective sanctions in place. We should have our chemical industry on line with our policy interests. But we, the United States, are not the principal supplier. The principal problem has been the European community. The bigger problem is the simple abundance of both high and low-tech chemical weapons technology in the developing world. There is a large trade in this technology, and in these chemicals. And we need to have our house in order, but it is not principally a problem of corporate culpability.

Senator NUNN. Thank you. My time has expired.

I will come back on the second round, because I have taken enough time; and Mr. Gaffney made some notes.

Senator Glenn.

OPENING STATEMENT OF CHAIRMAN GLENN

Chairman GLENN. Thank you, Mr. Chairman.

My opening statement was still being typed when we opened the meeting, and it is available now.

[Prepared statement of Chairman Glenn follows:]

STATEMENT OF CHAIRMAN GLENN

Chemical and biological warfare is one of those subjects that deserves to be called a dismal science. Yesterday, in testimony provided by physicians who observed and treated victims of chemical weapons in Iraq. The committee was exposed to the full extent of the psychological and physical agony that such weapons produce.

If that was not dismal enough, we were told by experts on chemical and biological warfare from the U.S. Army that is is virtually impossible to stop a determined group or individual from developing such weapons, crude but effective though they may be.

When you combined these findings with what the Director of Central Intelligence told us—namely, that 20 nations are working right now developing the capability to make chemical weapons, 10 countries are seeking to develop biological weapons, and 15 nations are working on long-range ballistic missiles—there is a strong temptation to just throw in the towel and give up on nonproliferation.

Unfortunately, we just do not have that option open to us—we are a nation with global responsibilities and these are not the kind of problems that we can, or should walk away from.

A new part of the equation is that weapons of mass destruction are no longer solely in superpower arsenals. Whatever our nonproliferation efforts, we may find that superpower-mass destruction-capability will now be in the hands of almost any nation that desires to possess it—with the potential for use in regional or local border conflicts that have in the past drawn only passing attention.

Perhaps this has already gone to the point where we must match our nonproliferation and verification efforts with strong sanctions against any nation that uses CW/BW; that is, advance agreements among all nations that any use of these weapons by any nation would mean immediate sanctions of a combination of such things as trade embargoes, communication reduction or termination, severe airline travel restriction, and so forth. In other words, we should use retaliation by the world community in real, tangible, and immediate terms. A user should be considered irresponsible, a pariah among nations, and must be treated accordingly.

Perhaps we are at the point where these issues must be more seriously considered by our negotiating teams in Geneva and elsewhere.

Now to the specific subject of today's hearing. We will discuss the pros and cons of various proposals to establish a comprehensive and verifiable international ban on the production, storage, or use of these deadly weapons. We all want to eliminate these wepons—the problem is how to assure that other nations that are party to such an agreement are complying with their commitments. But the small manufacturing space required, the relatively low technology and the common materials available for the production of chemical and biological weapons suggest that we have an uphill climb.

Since virtually no arms agreement in history has ever met the test of 100-percent verifiability, we need to ask how much verification is enough? Professor Steven Meyer of MIT once put the question this way:

"Is the military and political threat posed by undetected cheating greater than the military and political threat posed by unconstrained military activity?"

I have seen the prepared statements of most of today's witnesses and I understand that they have different answers to these questions. I look forward to a lively exchange today, because I know that great agreements are often the product of great debates.

Chairman GLENN. Some of the points I made in my opening statement were along the same lines of some of the things that have already been brought up here. I went through very briefly some of the things that we had in testimony yesterday about Judge Webster, talking about 20 nations working now, developing the capability to make chemical weapons; 10 probably seeking to develop biological weapons; 15 working on long-range ballistic missiles.

Sometimes you almost throw in the towel; what can we do? We found this battle on nuclear nonproliferation, and a comparatively few nations have still gone under that additional capability. I am not willing to just walk away and say, no, we have to give up; we cannot have a treaty; we would never verify it; we would never be able to do that anyway. But I think that one thing we really have to admit now is that super-power type destructive capability can now be in the hands of almost any nation around this world, and in a very short period of time. All we have to do is look at the charts over there, about what is going on, and in a tiny little time frame, because this stuff is not that technical; it is not that tough to make. The technology is there. As was testified to yesterday, any good college chemistry student probably can look up in the books a formula and start, if they wanted to, to set up a plant.

The Judge testified yesterday that a quite credible plant could be put within this room, the size of this hearing room right here, was his testimony yesterday.

So we talk about verification, whether that is all important, and to me, you verify, and you find there is a violation—then what? So we verify, and we say, "You should not have done that." I think we are to the point now where we have to put a great deal more emphasis, as I say in my statement, on sanctions, which have already been mentioned—not just trade embargoes, big things like that, but specific cut-offs of communication, specific ceasing of airline travel to that country, specific communications cut-offs, telephone service, international communications—cut off to violators of this. It seems to me we have to push for that and push very, very hard.

People would know in advance that there are 130 nations or whatever it is—they would know in advance that if they dared use chemical weapons, then the sanctions are going to occur. It seems to me that we have to push very hard for that. We have not done that. We have been acting, perhaps, as though there is a ban that could be put on that would be verifiable, and I think the difficulties, as you point out, of verifying every place in this world where there might be quite a large weapons capability is going to be virtually impossible.

I never have bought onto the idea in nuclear proliferation, as some people did, that, yes, spread the technology all over, and then everybody will have it, and nobody will dare use it. That thought has been put forward. I have been on the other end of that log in my whole Senate career, as I think both of you are well aware, in many hearings we have had right here in this room on that subject—and we passed the Nuclear Nonproliferation Act back in 1978 that we put together right here in this room and had hearings on it.

But I begin to wonder with the commonality of this stuff all over the world, are we back to just "MAD," to "mutually assured destruction"—is that what we are back to as a way of controlling this whole thing? Is just sheer fear of reprisal going to be the biggest restraint we have, more than verification or more than anything else?

I do not know. I am asking a question here. It has popped into my mind that that may be the biggest deterrent we have. And I hasten to add, I am not for pulling back; I want to see the treaty, I want to see verification, I want to see us make every effort to prevent the spread, to find out where the capability is, to put nations on the hot seat that go ahead with developing this capability, if we can. I want to prevent everything we can prevent, but it just looks to be so common if you just glance at the map over there, that the biggest deterrent may be the factor that it is now so common.

Is that a possibility?

Mr. GAFFNEY. I would offer, Senator, that it is not only a possibility—and I think Brad addressed this in his opening statement—it is the proven deterrent to chemical weapons attack. When the other side is armed with the capability, the credible, reliable ability to respond in kind, it has proven in the past to be an effective deterrent.

The Iran-Iraq war arguably is an exception. If it is, I think it is an exception that proves the rule. But everywhere else that you can think of did not——

Chairman GLENN. But look what happened on the Iran-Iraq war. We had chemical warfare, people bleeding on our living room rugs every night on the TV almost, and the world was ho-hum—"Oh, yes, they are killing each other, and it is a war we wish was not going on," and we did not get that excited. I found that hard to accept, hard to believe, that here we are into chemical weapons of mass destruction—if that had been France attacking Germany, or Germany attacking France, or someone else—if it had been a European conflict—what would have been the public reaction there? And the world accepted that. We did not even get excited about that, hardly at all.

Mr. GAFFNEY. Well, that is the point I was trying to make about the Paris Conference. I think there was a lot of hand-wringing, but when you get the Iraqis standing up and denouncing chemical first use, you realize that this is a Kafka-esque exercise. As a practical matter, you cannot rely upon the court of world opinion or some such high-sounding principle to prevent the use of chemical weapons. And that, after all, is already banned by an existing arms control agreement, Senator.

Chairman GLENN. Well, are we capable of setting up a worldwide sanction? The thing is, if this is going to be this common, how do we prevent the use—if the stockpiles are going to be out there—how do we prevent some misguided national leader from saying, "Today, we are going to use it."

He has got to know that the wrath of the civilized world and the whole world is going to come down around his country, it seems to me.

Mr. GAFFNEY. That ought to be precisely the point. It seems to me we have got a treaty on the books—in fact, there is an insert for the record that my colleagues at the Center for Security Policy, Doug Feith and Amoretta Hoeber, wrote in the New York Times recently, that makes the point well—we ought to try to fix the existing treaty which bans first use before we get into vastly more complex and ambitious proposals, like banning——

Chairman GLENN. The red light is on, and I am beyond my 5-minute question period, which I took up mostly with a statement, obviously, but we will get back to other questions.

Senator Lieberman?

Senator LIEBERMAN. Thank you, Mr. Chairman.

Mr. Gaffney and Mr. Roberts, thank you for your testimony.

I would like to continue along the line that Senator Glenn has just been pursuing. My question goes back to something that was considered earlier when we went from the moratorium to the beginning of production of the binary systems again. I want to pick up on something you said. What is the proof that the capacity to retaliate with chemical and biological weapons to a potential chemical and biological attack does have a deterrent effect?

Mr. GAFFNEY. Well, I think with the possible exception, again, of Iraq, I am not aware of biological weapons being used, so let me just address the chemical weapons business.

Senator LIEBERMAN. Fine.

Mr. GAFFNEY. It is sort of proof by the absence of its use. In, for example, the Second World War, it is often said that the vast stockpiles that the Germans had available to them were not used against Allied forces even when the Nazi regime was in extremis, because of an appreciation, which might in fact not have been right, that we had the wherewithal to retaliate massively in kind.

The other cases where chemical weapons have been used—and I think, Brad, you may comment on this, too—as far as I know, with the possible exception of the Iran-Iraq conflict, has, from the First World War on, been under circumstances in which the receiving country did not have the capability to respond. So it is a deductive reasoning, I guess, but it seems to be fairly well-subscribed to that you have had deterrence where you do have the retaliatory capability, and you do not have deterrence, or you do have first use, at least in certain instances where a country felt it could get away with it.

Senator **Lieberman**. Mr. Roberts?

Mr. **Roberts**. I recommend two short studies on the subject which I think shed some important light on that. One is a book by Frederick Brown, entitled simply, "Chemical Warfare". He does a very interesting summary of the historical record in terms of deterrence, arguing basically that we do not have enough evidence to make a conclusive argument, but it is suggestive of the conclusion that Frank has offered.

The second piece is a very fine essay that was in International Security in 1985 on chemical deterrence during the Second World War, examining the widely-held assumption that deterrence worked, that chemical deterrence was proven by the experience of the Second World War. The analysis shows—or the author argues, at least—that it did some of the time, and it did not some of the time; that the states made decisions with regard to their military capabilities for differing reasons at different times, and that what deterred chemical war during the Second World War varied greatly, depending on who you were talking about and what phase of the War you were talking about.

So that I do not think we can confidently say that chemical deterrence works all of the time.

Senator **Lieberman**. OK. And as I heard your testimony, at one point, I believe you said that the value of possessing chemical weapons and biological weapons may be as an incentive to other nations to negotiate, rather than as a proven deterrence to the employment of chemical and biological weapons by other nations.

Is that correct?

Mr. **Roberts**. I think the principal reason the United States should have chemical weapons is for chemical deterrence. I would not argue that we should create a chemical arsenal if we did not have one simply in order to create bargaining chips. I think that the arguments of the United States military that U.S. chemical weapons are essential to deter chemical conflict in Europe are highly credible arguments.

Senator **Lieberman**. Let me refine my question, then, to this extent. We had a fair amount of testimony yesterday contending that the widespread proliferation of chemical and biological weapons, their use in Iran and Iraq, and the "ho-hum" reaction that Senator Glenn referred to, suggests that the world has crossed a moral barrier. Even accepting the need for deterrence, why do we need a chemical or biological deterrent? In other words, why can't we rely on a nuclear deterrent to nations that might use chemical and biological weapons?

That follows from the idea that perhaps the best policy for the United States in this context is to stop making chemical and biological weapons—in fact, to destroy our supply as a way of setting a moral standard for the world—and rely on our other means of deterrence to stop other nations from producing and using such weapons.

Mr. **Gaffney**. Well, if I could just tackle that quickly, I think the truth of the matter is that the utility of nuclear weapons as a catch-all deterrent for all kinds of aggression has proven to be somewhat limited, to put it mildly. As a practical matter, I would also offer that the logic of that particular proposition could in fact be construed to argue for nuclear proliferation, a concern that Senator Glenn has addressed very eloquently.

If you think about it, other countries—perhaps Israel, as an example, perhaps others—who currently face CW threats—which I would fundamentally disagree with Brad—we are concerned about and must be concerned about—may well see fit to become more brazen in the threat of nuclear retaliation for a chemical attack. And I frankly do not think that is in the United States' interest.

Now, much of this gets caught up in the notion of setting models for other countries. The arguments goes: if we set the model by giving up our CW, that will prevent other countries from acquiring it. This is sort of the logic of nonproliferation that underpins the CW ban idea. I am not sure it would work that way.

Frankly—I would be interested in the Chairman's remark on this—but I cannot imagine people seriously arguing that we ought to give up all of our nuclear weapons in the hope that other people will not acquire them. I mean, some do, but I do not think serious experts make that argument, and in fact the premise of the nonproliferation treaty was we would, yes, try to reduce our nuclear stockpile, but it was obvious that "thems what had them" were going to hold onto them.

I think that ought to be a centerpiece of any efforts that we make to try to stop the proliferation of chemical weapons as well, because frankly, I do not think there is any other alternative.

Mr. ROBERTS. May I make a quick, somewhat different comment on this? We need to distinguish between chemical and biological weapons. In the biological area, we have made a decision that we do not need biological weapons even if somebody else has them, because it is credible to deter a massively destructive attack on the United States with biological weapons with another weapon of mass destruction, a nuclear weapon.

Senator LIEBERMAN. But that was really my next question. I should stop now, because the red light is on—but why are we not producing biological weapons? Isn't the logical extension of the argument here that if chemical deters chemical, then biological ought to deter biological, so we should be manufacturing biological weapons as well?

Mr. ROBERTS. That is the logical extension, but I think it is an incorrect extension.

Senator LIEBERMAN. Why?

Mr. ROBERTS. There are important differences between chemical and biological weapons. Biological weapons are true weapons of mass destruction. A very small quantity released from a bomb over a city eliminates the city; the same effect as a nuclear weapon. A chemical weapon, in certain Third World scenarios has a strategic effect—it is a poor man's nuclear bomb—but that is a bit of a misnomer. Chemical weapons are tactical weapons. And we cannot deter a tactical use of chemical weapons by threatening strategic nuclear war; it is not credible. It invites that chemical attack. So my point would be that biological weapons are not like chemical weapons; biological weapons are more like nuclear weapons, and we need different policies.

Senator LIEBERMAN. Thank you.

My time is up.

Chairman GLENN. Senator Kohl?

Senator KOHL. I have several questions.

Mr. Gaffney, in terms of morality or military utility, do you differentiate between chemical/biological capability and nuclear capability, or how do you differentiate?

Mr. GAFFNEY. Well, I think as a practical matter, Senator, all of them are dreadful weapons. I am not sitting here before you today, encouraging the retention of a modest chemical capability out of a conviction that we ought to have them and use them at any opportunity, by any means. I am making these representations out of a conviction that the alternative of our giving them up—chemical weapons, in this case—is simply that we will be doing so unilaterally.

We have already unilaterally given up BW. There is a treaty on the books—my testimony addresses this point—we are out of that business. I am not encouraging going back into it, though I think Senator Lieberman is absolutely right. The logic of what I am saying does suggest that since we know—I think the DCI addressed this yesterday with you; if he did not, you had better get him back—we know that other countries around the world are engaging in the production and stockpiling of biological weapons.

President Reagan formally charged the Soviet Union with violating the BW convention after it had an explosion at a facility we believe is associated with biological weapons production, which proved that considerable numbers of people could be killed if they were unfortunately downwind from that facility.

I would not want to put it to Kurds as to whether or not the slaughter of their village was a tactical slaughter or a genocidal, massive slaughter, but I think you would find in terms of raw numbers, the number of people killed by Iraqi use of chemical weapons and innocent Soviet citizens killed around Sverdlosk was probably about the same.

So my only point is that nuclear weapons are an imperative in my view as a means of preventing some kinds of aggression. Hopefully, they will continue to deter nuclear aggression. We have threatened them, I think credibly, for 40-odd years as the ultimate recourse in the event there is massive conventional aggression against us and our Allies in Europe. I think we must retain them.

We have chosen as a matter of state policy to give up biological weapons. I think at a minimum we ought to be doing something to worry about what happens if somebody else uses biological weapons we know are being developed against us—defenses, antidotes, research, that sort of thing—even at a modest level. And we have not yet chosen to give up CW, and I think it is imperative that we not do so, because I do believe that it contributes fundamentally to deterring that kind of aggression.

Senator KOHL. Mr. Roberts?

Mr. ROBERTS. I would make one additional comment to what I have said before and what Frank has just said, and that is that on this point of chemical deterrence, what is it about chemical weapons that deters somehow that biological weapons do not, and all of that. Again, we think of this in a NATO context. We think in terms of chemical war between the United States and the Soviet Union on a central front. It is a highly-mechanized front. And the point of chemical weapons use would not be to kill the soldiers on the other side. The point of the use of chemical weapons would be to force the opponent's military force to fight from a chemical-protective posture. The military effect of killing Russian soldiers with chemical weapons is much less than the military effect of forcing Warsaw Pact forces to fight inside this protective posture.

We banter around raw numbers or guesstimates and say, well, a military force that fights inside protective gear diminishes its capacity by 50 percent. Some things do not diminish 50 percent; other things diminish to zero. NATO air sorties will drop to zero 24 hours into a chemical war. NATO air capability is crucial to the prosecution of Western defensive strategy.

Chemical weapons are thus essential in the arsenal of the West in order to impose that cost on the Soviet Union. They have no offensive purpose from our point of view. Should the Soviets engage in the use of chemical weapons, and if we could not retaliate to that, we would be in a circumstance that they controlled entirely the pace of the conflict. That is not acceptable. And the possession of a retaliatory capability offers a credible return. It need not be a large one, because we do not intend to fight a major chemical war. It is a modest retaliatory capability.

Now, if you think about biological weapons, if the Soviets were to unleash a biological attack on Western soldiers, Western armies would be decimated. So the functions of these weapons are quite different, and the reasons that we have chemical weapons are quite specifically to deter Soviet attack.

This goes to the heart of my skepticism about why chemical weapons in the Third World matter to the security interests of the United States. I agree entirely that chemical weapons are bad news in the Third World; they are destabilizing for the reasons we have discussed. But in terms of the United States, why should we have chemical weapons, leaving aside NATO, leaving aside the Soviet Union, why should we have chemical weapons if Qadaffi has them? Do we really expect that by forcing the Libyan military to fight in a chemical-defensive posture that that is going to influence the outcome? No. It is our ability to escalate conventionally.

So I do not believe that we need chemical weapons in order to live in a proliferated world unless that proliferation is to regions where we have key interests, where we expect to fight.

Senator KOHL. May I just add a quick question?

Chairman GLENN. Yes, go ahead.

Senator KOHL. Mr. Gaffney, do you believe that we can verify the weaponization of chemical agents?

Mr. GAFFNEY. No, I do not, Senator.

Senator KOHL. Thank you.

Chairman GLENN. Thank you.

Just to follow up a little bit on a couple of these things, and we will have a second round.

Mr. Roberts, we had testimony yesterday that we could put quite a credible laboratory or factory in this very room here, and that biological agents, certainly—enough to kill thousands of people—could covertly be carried by one person.

Does this affect your theory that it is not important to detect all of the cheating—you indicated, I believe, in your testimony that it was not necessary to know where all of these things are. And yet, one factory in the hands of one person can wreak untold thousands of lives being lost.

Mr. ROBERTS. No, I do not think it changes the way I think about my testimony. If we set as our goal the perfect knowledge that in every facility in the world capable of doing this, nothing nefarious is going on, we certainly cannot meet that goal. I simply do not understand why that should be our goal. Our goal should be to reassure ourselves that states are not producing a militarily significant chemical war fighting capability. The odd terrorist or the renegade state in the Third World is not the principal national security concern of the United States.

Chairman GLENN. We could debate that one all day, because I think we are rapidly getting to that point, where weapons of mass destruction are usable by smaller and smaller groups and entities of which we do not even know the names right now—that are weapons of mass destruction. This is not shooting one or two people along a border someplace; it is that if something is produced and brought into this country, then it is capable of killing maybe 100,000 people, which we consider a very major disaster, obviously. And I know that in a big, all-out attack, use of chemical weapons, the retaliation can be our nuclear weapons, that is true. But in the scenario I just mentioned, who do you attack? You cannot do that.

Mr. ROBERTS. I agree entirely.

Chairman GLENN. That is what is so difficult about this problem.

Mr. ROBERTS. I agree entirely, and I accept that the verification problem that we would be talking about in a chemical agreement is much greater than the verification problem we have faced in any other arms control agreement.

But my question, then, is what decision does that put before us as policymakers, as a policy community? What choices do we then face?

Chairman GLENN. We have to try and prevent the spread; we have to try and do everything we can to stop the proliferation of this stuff; we have to follow up on it; but we also have to have the toughest possible sanctions that we can have.

I am not willing to give up yet that we cannot stop some of the proliferation; we have to do everything possible.

Mr. ROBERTS. Oh, I agree entirely.

Chairman GLENN. But beyond that, it seems to me that we have to do far, far more in negotiating sanctions that will then be put in place, and that is about the only way we have that anybody has come up with yet.

Mr. GAFFNEY. I think, Senator, if I may, we are in violent agreement on that, certainly the three of us. The problem really is at what point do you follow Brad's logic and say we will give up our chemical weapons capability, as we have given up our biological weapons capability, with what I submit will be comparable results on the defensive side in both areas, as long as the reality is as he has described it, which is we will not know whether everyone else has given it up. And that especially is true if we are talking about arrangements whereby countries are expressly able to retain their CW capability or acquire it because they did not sign up to the so-called "global" comprehensive ban.

That is the point on which I hope I can most impress the Senate. The logic of this really is, no matter how you answer these questions, that we are going to be asked to take a terrific leap of faith toward giving up our deterrent, our capability and, I think, our defenses, knowing that others will not do so.

Chairman GLENN. The terrorist aspect of this is one that is very interesting, and I do not know that our developing a capability would not forestall a terrorist attack here from some little plant around the world someplace.

My time is up, and we are going to have to move along in order to get through the other two question periods. We have three more witnesses, so we are going to have to move along.

I would just say this. The moral aspect of this was brought up. I think the moral aspects of war changed dramatically for lots of people beginning about World War II, because the fine line that was drawn before that between the soldiers out there and the general population pretty much went down the drain during World War II with the massive bombings and killings, and the line between soldiers and citizens became so blurred that I think it is blurred forever. The moral aspects of this thing to me are—I will not say they are complete figments of somebody's imagination in the modern world, but it approaches that.

Senator Lieberman?

Senator LIEBERMAN. Thank you, Mr. Chairman.

Mr. Gaffney, I want you to address in a little more detail a line of thinking that Mr. Roberts has pursued—the question of what we are most worried about with regard to the employment of chemical and biological weapons. Senator Glenn's questions suggested the same line of inquiry.

I am wondering whether the strategic thinking in the United States on this problem has focused too much on the possible use of chemical and biological weapons by the Soviet Union in relationship to NATO. Obviously, this is an important question. But the testimony about this proliferation clearly suggests that, insofar as American national interests—and if I may say so, parochially, our interests—are concerned, we may face a greater threat from the use of these weapons by what I would call outlaw nations, renegade nations, such as Libya, Iraq, et cetera.

How does your strategic thinking about deterrence apply to those types of threats, that is, state-sponsored terrorism and acts of chemical and biological warfare against the United States or our personnel abroad.

Mr. GAFFNEY. Senator, I am delighted to try to take that on.

As I see it, we have not spent too much time thinking about the effects of Soviet CW. And again, I am leaving BW aside because, Senator, I cannot impress this point upon you too strongly, we do not think about that. That is too hard. And because there is a treaty that bans it, we are not supposed to think about it. It is insanity, in my view, however, not to worry about it, especially when you know others are preparing to perform, I believe, biological warfare, and that such preparations are now proliferating into Third World countries.

Anyway, putting that aside, CW is something I do not believe NATO has adequately thought about in the Warsaw Pact context. I agree with essentially everything that Brad said about our vulnerabilities to a CW attack from the Soviets, with one important exception. I think Soviet chemical weapons are understood by them to be very effective military tools—not just because they have the potential if not to eliminate, at least to do more to neutralize our technological advantage—the force-multiplier we rely upon to offset their quantitative advantages. But also the Soviets see CW's potential as a means of making pandemonium behind our lines at air fields, at POL depositories, at ammo dumps, and on roadways and other critical passes through which troops must move to the front and civilians must move to the rear. Such chaos can absolutely devastate the kind of structured NATO defense that we are supposed to present.

But beyond that, we do have interests elsewhere around the world, and I think if we have not defended properly for the major threat, it is almost certainly the case that we will be less than well-equipped to deal with lesser threats. And I think we need to be thinking, as your question suggests, about both much more seriously than we are—at present about equipping our forces better, about training our forces, about insisting that our Allies are doing the same.

There are some countries in NATO today, it might astonish you to know, that have precluded as a "moral policy" the issuing of defenses against chemical attack—no gas masks, the like. And this creates enormous vulnerabilities. They are vulnerabilities that are, to varying degrees, going to expose us to Third World or other attacks.

Now, as to the deterrent value of chemical weapons against terrorists, I think Senator Glenn is probably right. They are not necessarily going to have a material effect. I would like to think that the more express we are about our willingness to retaliate in kind for terrorist attack against us, against the state sponsors, if we can be credible about that, the more likely it will be that terrorists will not get their hands on weapons—at least from those state sponsors. But the technology is such that they do not necessarily need a Libyan plant of enormous dimensions, able to produce this stuff at high rates of efficiency, in order to get a little bit and do some real damage.

Senator **Lieberman**. I want to turn briefly to a different line of questioning. You, and all of us, are so concerned about the difficulty of verification, but we are talking nonetheless about applying sanctions. How do we know when sanctions are warranted? This will be quite a relevant question for us in this Congress, because we have legislation before us. What is the appropriate time to apply sanctions, either to other countries or to individual companies and industries?

Mr. **Roberts**. It varies with the type of violation or concern that we have detected. We in essence have a kind of informal sanction process at work today, with the Australian suppliers' group, which I suspect somebody has spoken about here yesterday, but it is essentially a group of countries that engage in the trade of chemicals as suppliers gather every 6 months under the chairmanship of the Australians, and they have done so since 1985, and their basic purpose is to keep an eye on the proliferation of chemical weapons and to come to ad hoc arrangements in problem cases.

There is a list of chemicals the trade in which is banned to suspected proliferants. There is a trigger list. And that should engage a cut-off on our trade of those chemicals with problem states. But that is a separate question from what do you do with a state that then uses chemical weapons such as an Iraq that breaks with its commitments under the Geneva protocol and actually uses chemical weapons.

Senator LIEBERMAN. Well, when would you apply the sanctions—when we have reason to believe from intelligence sources that a nation is acquiring chemical and biological capability, or that a company is supplying the precursors for that capability?

Mr. ROBERTS. I do not think we should wait until we see a chemical weapon used in war.

Mr. GAFFNEY. Could I just very quickly add, the early comments that I made in my submitted testimony about the infrastructure that is being emplaced around the world in, if not the guise, at least in the sense or context of commercial chemical manufacturing capabilities—fertilizers, pharmaceuticals, what-have-you—infinitely compounds the problem that you have just been addressing. Where you will ever be able to determine that sanction should be applied as you are seeing countries acquire an inherent capability as opposed necessarily to an actual capability or a utilized capability makes it a much tougher task. But I do not think it should deter us from trying to apply or figure a way to apply sanctions well.

Senator LIEBERMAN. Thank you.

Chairman GLENN. Senator Kohl?

Senator KOHL. Did you say, Mr. Gaffney, earlier, that you favor the United States taking out these plants in countries where we can and where there is clear evidence that they are producing?

Mr. GAFFNEY. I hope my comments were a little more nuanced than that, Senator, particularly when it was pointed out what some of the logical conclusions might be.

Senator KOHL. Even excluding the Soviet Union——

Mr. GAFFNEY. What I did say, and what I mean to say, is I hope that this body will be supportive of the President of the United States, and I hope our Allies will be supportive of the United States Government if it decides that the threat posed to the international order, and certainly our own equities, by the kinds of capabilities the Rabta facility, for example, will permit the Libyans to have and to transfer to others poses a threat to our interests that is not otherwise addressed; then I would hope that that support will be forthcoming because I think it is appropriate to consider that as a real option that is fully justified given our security interests.

Senator KOHL. I just want to understand you—so you are suggesting that with our capability and without the existence of any kind of a treaty banning CW, the United States, to the extent that it can should police CW capability around the world to the extent that we can, using the judgment, obviously, that we are not going to engage the Soviet Union.

Mr. GAFFNEY. This may sound flip, Senator—I would rather be a policeman than a mortician.

Senator KOHL. Okay. I just want to understand what your position is.

Do you have any comment on that, Mr. Roberts?

Mr. ROBERTS. I would agree with the view that we should have a right to use military force unilaterally to deal with major problem cases. I think that chemical weapons really are not going to put this on our agenda as much as biological weapons are a decade or two down the line.

But I think we need to be careful about how we do that; that if the world perceives that the use of force is our first resort and not our last resort, that will contribute to the problem we are attempting to solve; that there are states that will arm themselves that justify their armaments in this area on the basis of a threat from the United States, and to the extent we make that credible for them politically, we are cutting off our nose to spite our face, it seems to me; that there should be a time when unilateral military action is called for and justified, but it is not in every instance.

Senator KOHL. Thank you, Mr. Chairman.

Chairman GLENN. Senator Levin?

Senator LEVIN. Thank you, Mr. Chairman.

Just a few questions for Mr. Gaffney. As I understand your testimony, you are saying that the DoD did sign off and agreed to submit a draft treaty even though it believed it was unverifiable.

Mr. GAFFNEY. I would put it a little differently. The Department of Defense, as one of the component parts of the United States Government, acted in accordance with the direction of the President of the United States, following the action of the Secretary of State of the United States, to present its best judgment as to what could be done to forward or table a treaty. But I think you will find, Senator, and I encourage you to do so, if you can get your hands on the documentation that accompanied that, there were no representations made that the Defense Department was under any illusion that even with the most ambitious verification scheme one could imagine—an "anywhere, any time" scheme—we would have a verifiable treaty.

Senator LEVIN. But are you saying they did not sign off on it; they were directed to move forward——

Mr. GAFFNEY. I am saying, sir, that we were in the unhappy position of being obliged to do something which, had we had a chance to comment on it before the Secretary of State committed the United States to do it, we would have strongly opposed——

Senator LEVIN. I understand.

Mr. GAFFNEY [continuing]. And, having no choice but to act upon the initiative of the Secretary of State, we did the next best thing, which was to try to limit the damage.

Senator LEVIN. I understand. But you are saying, then, that they did not concur——

Mr. GAFFNEY. "They" being——

Senator LEVIN [continuing]. The DoD—is that right?

Mr. GAFFNEY. I am saying that we advanced a proposal with the view that it was the least damaging of the options available to us.

Senator **Levin**. You are just saying you do not agree with my phraseology, then, that they did not concur——

Mr. **Gaffney**. No—as always, Senator, it is always a pleasure to have a chance to reformulate your statements to make them my own. But my own statement on this point is——

Senator **Levin**. It is always a pleasure to try to get you to answer the question, too.

Mr. **Gaffney**. I know, and I am answering the question in my own words, which are: The Defense Department was obliged to sign up to an agreement, or a draft treaty in this case——

Senator **Levin**. I understand.

Mr. **Gaffney** [continuing]. That we did not in fact think was in our interest. And we did the best we could.

Senator **Levin**. Does the DoD believe that the "any time, anywhere" provisions would make the treaty verifiable?

Mr. **Gaffney**. No. It certainly did not at the time it was advanced, and I do not believe that is the view of the Department today.

Senator **Levin**. Therefore, they believe that this treaty is unverifiable.

Mr. **Gaffney**. I would encourage you to ask that of the next witnesses. But my own sense of it is——

Senator **Levin**. It does not necessarily follow——

Mr. **Gaffney** [continuing]. My own sense of it is that that is absolutely right, Senator. But I cannot speak for the Defense Department as I am not, as you may have noticed, an employee of the Defense Department at this point.

Senator **Levin**. The key question, then, that you are answering directly is that the DoD does not believe that the "any time, anywhere" provision makes this treaty verifiable. That is what you are telling me.

Mr. **Gaffney**. I am saying to you, sir, at the time that it was advanced, at the time I was in the United States Government, in the Defense Department——

Senator **Levin**. They did not believe that.

Mr. **Gaffney** [continuing]. They were under no illusion; they did not believe, if you choose, they did not believe that it would make this treaty verifiable, because there was no way to make this treaty verifiable. It would not be more verifiable, Senator, without that provision. It would be even worse without that provision. But as we have said in your absence, there is no way to determine whether people are making chemical weapons around the world—even if you can go anywhere, theoretically, at any time.

Senator **Levin**. I am not arguing with you on your conclusion about that. I am simply getting your testimony that the DoD, at the time that they agreed to advance this, for whatever reason, believed that this treaty was unverifiable. That is what you are telling me.

Mr. **Gaffney**. That is my testimony. And they made no bones about it, Senator; it was the best of a bad deal.

Senator **Levin**. Thanks.

Mr. **Gaffney**. My pleasure.

Chairman **Glenn**. We are going to have to move along. We could keep going here with questions of you two gentlemen, obviously, for the rest of the morning. But we do have to move along. We may have additional questions to be submitted, and we would hope you would answer those to the record if those are submitted to you.

Thank you very much. It has been very interesting this morning.

The next witness is Major General William Burns, U.S. Army, Retired, Director of the Arms Control and Disarmament Agency, or ACDA.

General Burns, welcome this morning.

We welcome also H. Allen Holmes, Assistant Secretary for Politico-Military Affairs, Department State, accompanied by Major General Arnold Schlossberg, Jr., Principal Deputy Assistant Secretary, Department of State.

Gentlemen, we welcome you all this morning and look forward to your testimony.

General Burns, if you will lead off this morning, I would appreciate it. I think we will hear all the statements and then get to questioning by Senators.

TESTIMONY OF MAJ. GEN. WILLIAM F. BURNS, U.S. ARMY (RET.), DIRECTOR, ARMS CONTROL AND DISARMAMENT AGENCY

General BURNS. Thank you, Mr. Chairman.

Mr. Chairman, I have a statement I would like to present simply for the record and summarize it very quickly.[1]

Chairman GLENN. That is fine. Without objection, the entire statement of any of you who wish to put a statement in the record will be included in the record in its entirety as though delivered, and you can summarize your statement.

General BURNS. Mr. Chairman, chemical weapons proliferation poses an urgent challenge to the family of nations and, I must add, to chemical proliferation, the problems of missile and nuclear proliferation. The use and recent revelations about the Libyan chemical plant at Rabta simply highlight this.

As you know, early in January most of the nations of the world met in Paris, 149 states, over half of them with delegations headed by foreign ministers. This conference, in a period of about 5 days, forged a global consensus. Its final declaration summed up this consensus as follows. It condemned the use of chemical weapons, reaffirming the 1925 Geneva Protocol. It expressed grave concern about proliferation of chemical and biological weapons, and it called for full support of the UN Secretary General's efforts at investigating possible illegal use and also called for support for actions under the United Nations Charter. It stressed the necessity to conclude a global, comprehensive and effectively verifiable ban on chemical weapons.

The result of this conference, of course, was public and government awareness and, I am happy to report, government actions.

With this, I am gratified, but not satisfied. Much is yet to be done. We must maintain public, government and industrial awareness of the problem. We must examine ways to further improve domestic controls and encourage other governments to deal with their problems of domestic control. And we must be prepared to be forthright in dealing with any future use of chemical agents.

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[1] See p. 359.

We approach the current round on the Committee on Disarmament in Geneva with renewed effort to resolve the current monitoring and verification problems, but also with renewed understanding, I think, on a worldwide basis of the difficulties inherent in verification.

I think the world in recent months has adopted a truly cooperative spirit in this area. I detect this cooperative spirit also within the United States Government. For instance, on our delegation in Paris, we had Congressional representation, and representation from the Senate. What was perhaps even more impressive was that several Members of the Congress who happened to be in Paris stopped by and contributed their presence with the U.S. Delegation to demonstrate solidarity in a truly bipartisan way, and for this, I am grateful.

This hearing itself, and early opportunities that I have had here on Capitol Hill to consult and to testify show that we do approach this problem from a serious and a bipartisan area.

I recognize that there is pending legislation, perhaps which will be produced by committees of the Congress. I cannot comment on specifics of this legislation, but I assure you that as head of ACDA, I will examine each proposal very thoroughly, and the Administration will also examine these proposals thoroughly as part of its general review of arms control about which you have heard.

I note particularly, however, President Bush's commitment in his address last night before the Congress, where he said "Chemical weapons must be banned from the face of the Earth, never to be used again. Verification will be extraordinarily difficult, but civilization and human decency demand that we try." All I can add to that is, Mr. Chairman, ACDA will do its part in this effort.

Thank you very much.

Chairman GLENN. Thank you.

Mr. Holmes, do you have a statement?

TESTIMONY OF H. ALLEN HOLMES, ASSISTANT SECRETARY FOR POLITICO-MILITARY AFFAIRS, U.S. DEPARTMENT OF STATE, ACCOMPANIED BY MAJ. GEN. ARNOLD SCHLOSSBERG, JR., PRINCIPAL DEPUTY ASSISTANT SECRETARY, U.S. DEPARTMENT OF STATE

Mr. HOLMES. Yes, Mr. Chairman, I have a statement which I would like to give to the Committee for entry into the record.[1]

Chairman GLENN. It will be included.

Mr. HOLMES. And I will just make, if I may, a few preliminary remarks.

General Burns has covered the serious problems that we face in trying to get chemical/biological warfare under control, and I would just like to make these observations.

We have heard testimony and read articles and listened to talk shows about how hopeless the situation is; that we cannot control the spread and use of these weapons. I do not subscribe to that point of view.

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[1] See p. 366.

We need to attack this problem on a broad front, engaging the Congress and the private sector with the Executive Branch in a cooperative effort. No single approach will be sufficient. Each effort needs to be improved, whether it be the negotiation of a comprehensive, verifiable global ban at Geneva, or work with the Chemical Manufacturers Association in designing the best possible way of monitoring dual capable industry, or effecting ever better controls on exports in the Australia Suppliers Group, or helping improve the UN Secretary General's ability to carry out prompt investigations of alleged chemical weapons use.

By working hard in all of these areas in a concerted way, we stand to improve the prospects for defeating the CBW scourge. Having testified yesterday before the Senate Select Committee on Intelligence and talked with the Congressional Members of Secretary Shultz's delegation to the Paris Conference, I am impressed by the determination of Congress to help deal with this pressing problem.

Thank you.

Chairman GLENN. Thank you, Mr. Holmes.

As I understand it, General Schlossberg, you do not have a prepared statement; is that correct?

General SCHLOSSBERG. I do not, Senator.

Chairman GLENN. Thank you.

General Burns, in your full statement, which I have read, I do not want to talk down anyone's efforts; I am for any effort that is being made to address this problem. But throughout this statement, we have something like, "the Conference forged a powerful global consensus"; "nations took a principal and forceful stand"; "the Conference condemned this," "stressed the importance of that"; "expressed grave concern that we exercise restraint"; "the necessity of concluding a comprehensive verifiable ban"; "unlimited duration"; "result, any first use of CW in the future will be severely condemned by the nations of the world"; "consciousness level has been raised"—and on and on here. I could give other examples.

We do not have anything concrete that says when we have discovered a violation through verification, then what happens. And we will say the nations of the world would be so outraged that something would happen, and yet we saw Iran and Iraq go at it, and we did not even cut off the supplies of other arms that were going to either one of those countries by any sort of moral outrage of the world.

What do we do beyond just the verification, which is going to be extremely difficult to verify, but let us say we verify—then what? And are we addressing that with the discussions that you are having with the Conference?

General BURNS. Senator, first of all, you are absolutely right; talk gets you nowhere beyond a certain point. I think, though, that we have to recognize that the world we are talking about today is not the world of 1984, 1985 or 1987.

One of the striking things about this conference was that the United States and the Soviet Union had no basic disagreements about the goals or the outcomes. I think one of the impressive outcomes of the conference in terms of what you do if there is a violation was the general recognition that perhaps we had better go back and take a look at that document we signed in San Francisco in 1945, which is replete with sanctions and actions which the Security Council can take, and the Security Council has not taken since 1950, and it took it then as a fluke.

Now, if the United States and the Soviet Union and the other three veto powers of the Security Council decide on sanctions, then the world for the first time can do something. I think there are a number of things that can be done—everything from economic pressure to economic ostracism to military action. I think it is about time we considered these things.

Chairman **Glenn**. Well, you are talking about our relationship with the Soviet Union as though that was conclusive for everyone. And yet what happens if—read down the list over there on the wall—what happens if we have a violation in Indonesia, Israel, Laos, Libya, North Korea, Romania, South Africa, Syria, or any one of the other nations over there? The problem is this is not just between us and the Soviet Union and the very few other suppliers that have worked in the nuclear area and had some little success maybe in preventing some of the spread, anyway, of nuclear weaponry. I have worked on that thing ever since I have been in the Senate.

This is a different ball game. It can be put together a credible capability, as Judge Webster testified yesterday, within the size of this room here. And the technology is not complex. We do not need a big infrastructure. And to make weapons that could kill hundreds of thousands of people, we need very little in the way of supplies of chemicals and equipment, and yet we are talking about trying to verify, as though verify were the end product.

What do we do when we have verified and find a violation?

General **Burns**. Well, first of all, you may be talking to the wrong individual, Senator, since ACDA is in the business of verification, not in the business of the physical enforcement of treaties.

However, let me answer it this way. Verification is a step on the road. Once we determine that a violation has taken place—and I think we are moving in that direction right now—then it is essential, as you suggest, that there be actions which the community of nations accept, imposed upon a violator.

The world is not very good at doing that. The kinds of things that I suggested are the kinds of things that I think we have to investigate. My remark about the Soviet Union simply indicated that there appears to me to be a confluence of interest between the Soviet Union and the United States on this particular issue, which makes use of the U.N. as a vehicle much more possible than in other areas. And I think this is the area that I would like to see explored, and I do not think we have.

Chairman **Glenn**. Mr. Holmes, are we considering a preemptive military strike against the Rabta plant in Libya?

Mr. **Holmes**. I do not have any information about what the new Administration may be contemplating. The policy on chemical and biological warfare is being reviewed currently by the Administration, along with other arms control policies.

Chairman **Glenn**. I think you were in the other room, but Mr. Gaffney testified that we should be willing to destroy such facilities if we deem them grave enough menace. Do you agree with that?

Mr. **Holmes**. I would not want to predict in an open hearing what options should be pursued by the United States. I think all options should be looked at in any review. And I imagine that in reviewing our policy on chemical and biological warfare that all options are being looked at.

Chairman **Glenn**. This Administration is being looked at as a continuation pretty much of the last Administration, the same basic policies; we have not had any major statements of new policies, and we know that the last Administration did make a decision to unilaterally strike Libya.

Are you working on what criteria would have to go into such a decision before action takes place and whom we would work with on that? My question, obviously, is we strike Libya, it is popular; why did we not, then, strike Iraq and Syria and some of the other places where we know there would be similar things going on?

Mr. **Holmes**. Senator, the criteria for how to deal with the chemical and biological weapons problem are much broader than simply military action, and run from how best to complete the negotiation that is underway at the Conference on Disarmament in Geneva to improving export controls on the materials that are used to manufacture these weapons to cooperative measures with industry.

Chairman **Glenn**. Senator Levin?

Senator **Levin**. Thank you, Mr. Chairman.

First, on Rabta. Do you believe, Secretary Holmes, that the United States can tolerate indefinitely the chemical plant at Rabta?

Mr. **Holmes**. I think the chemical plant at Rabta is a danger for the world, given the track record of the Libyan government in harboring terrorists within its own territory and promoting terrorism.

The fact remains, however, that in today's world we do not have an international statute that forbids the manufacture and stockpiling of chemical weapons, and that is one of the goals of the conference in Geneva, to conclude a convention that would ban all production and stockpiling and use and transfer of chemical weapons.

Senator **Levin**. Then, you are not able to say that we cannot tolerate the Rabta plant indefinitely; you are not willing to phrase it that way, is that true?

Mr. **Holmes**. Well, you have to wonder what you mean when you say "tolerate," because there are actions that obviously flow from that. Obviously, it is a matter that disturbs us very much, and that is why we launched a campaign, a diplomatic campaign, both publicly and privately with governments, to dissuade any government that might be contributing either materiel or technology or expertise, to allow that plant to go into full production. And that campaign is continuing. I was looking yesterday at——

Senator **Levin**. Well, thank you, that is great, thank you.

Mr. Gaffney testified that in 1987, every involved agency of the United States Government recommended that the formal United States position seeking a global ban on chemical weapons be abandoned. Did the State Department recommend in 1987 that the formal United States position seeking a global ban on chemical weapons be abandoned?

Mr. **Holmes**. No, it did not.

Senator **Levin**. General Burns, did ACDA recommend in 1987, that the formal United States position seeking a global ban on chemical weapons be abandoned?

General **Burns**. No, sir, it did not.

Senator **Levin**. General, do you believe that the draft treaty which Vice President Bush tabled in 1984 was unverifiable?

General **Burns**. I believe that the draft treaty which was tabled in 1984 is a sound treaty in terms of the provisions for the abolition of chemical weapons, but the draft treaty has not yet had appended to it the detailed verification program required, so that the treaty at this time is an imperfect treaty and an incomplete treaty. One of the major tasks before us is to work on that verification protocol.

Senator **Levin**. Did we not have a package of sound procedures to verify compliance in 1964?

General **Burns**. We did not.

Senator **Levin**. What did Vice President Bush mean, then, in Geneva in 1984 when he said, "This new concept is part of a package of sound and reasonable procedures to verify compliance?"

General **Burns**. We had a number of procedures in 1984 for the verification of the INF Treaty. If these procedures had been the only procedures we had applied to the treaty in 1987, it would never have been ratified by the Senate. This is an evolutionary process——

Senator **Levin**. The INF Treaty?

General **Burns** [continuing]. I am saying the INF Treaty. I am drawing a parallel between that and where the INF Treaty was in 1984 and where the CD treaty is right now.

Senator **Levin**. The paragraph that I read to you was not referring to INF; it was referring to CD.

General **Burns**. I understand that, Senator. All I am saying is that——

Senator **Levin**. What did he mean when he said, in referring to the CD draft treaty he was tabling, that "This new concept is part of a package of sound and reasonable procedures to verify compliance"? You have said there was no such "package"?

General **Burns**. No, I said——

Senator **Levin**. What did he mean when he said there was a package?

General **Burns**. I said there was not a complete package. Let me just explain.

Senator **Levin**. There was a partial package that he was referring to?

General **Burns**. That is right. There was a skeleton, an outline, of verification proposals. These must be negotiated, and particularly in a multilateral environment such as this, it is a rather complex negotiation. It was a skeleton outline of a verification package. The package was certainly not complete.

Senator **Levin**. That was the skeleton outline which the Soviets accepted?

General **Burns**. That is correct.

Senator LEVIN. Do we now have a complete package?

General BURNS. We are working on a complete package.

Senator LEVIN. When will we finish that?

General BURNS. I would imagine that additional basic research is required before we have that package, and not only the United States, but a number of other countries in the world, are working on it. For example——

Senator LEVIN. Do you have a timetable?

General BURNS. We do not.

Senator LEVIN. Do you have an estimate?

General BURNS. I would hate to estimate the length of time it would take to work a verification package, since my estimates on other treaties have been wrong in the past; but I would say we are talking——

Senator LEVIN. We make guesstimates all the time; that never stops us.

General BURNS. Yes, sir, I recognize that. No, I would——

Senator LEVIN. Take a look at Gramm-Rudman; that ought to be your model.

General BURNS. I hope not. I would estimate that we are talking about years, we are not talking about months.

Senator LEVIN. We are talking years before we propose a package?

General BURNS. No. We are talking about years before we have an acceptable verification package fleshed out in all its glory.

Senator LEVIN. That we propose.

General BURNS. That we could accept.

Senator LEVIN. What about a package in all its glory that we propose—months or years?

General BURNS. It is hard to say, but I would say it would certainly be months.

Senator LEVIN. My time is up. Thank you.

Chairman GLENN. Thank you. We will have another round here shortly.

General, you have looked into this thing carefully, I am sure. Do you believe it is possible to verify everything that we might want to know worldwide, because you are aware Judge Webster testified that a quite credible factory could be in a space the size of this hearing room; he testified to that yesterday. It is already widespread in just a few years, as far as the technology goes. It is low-tech; any college chemistry student can look up the formulas; it is just a matter of getting the material. The materials are common; low dollar requirement if you wanted to set up a plant.

It would appear that we are addressing giant plants for giant wars, and yet that is not where the threat is going to come from, I don't think. I think it is going to come from factories like this.

How are we going to verify things like that? Are you confident, number one, that we can?

General BURNS. I am growing more confident that at some time in the future we can. I would be remiss in my duties if I said I had an answer for the problem of verification right now. I think we have to make a distinction, though, between perfect, absolute verification, which is impossible in any treaty, and the degree of verification necessary to give us the high level of assurance that we can detect violations of the treaty that matter in sufficient time to do something about it. I think that that is at least theoretically possible with some of the research that is going on right now.

There is also the effect, as you pointed out earlier from my statement, of the sense of world opinion which, if properly used, will make it more difficult for nations to flaunt use conventions such as has happened recently with Iraq and Iran.

Chairman GLENN. Why do you think we are moving away from that lack of concern? We had our conference. Who is going to stand up at an international conference and say, "We are against everything going on here"—nobody. Everybody is going to agree to it; we hail it as a great step, and I think it is a great step and I support that. But in the one instance where we had the focus of the world on a particular situation where weapons were actually being used, people being killed, and the world was sort of "ho-hum" and did not really pay that much attention.

General BURNS. I think that is very true, and I think that was the tragedy of the event. Now, what could the United States have done, I think is your question, or what should the United States have done at the time. It is hard to say because for reasons probably extraneous to the use of chemical weapons, that war came to an end. What the United States could or would have done, or its Allies could or would have done, is problematic.

I think that that heightened sense of concern in the world about chemical weapons will make it easier for countries including the United States to take action in the future. In my review of what is happening in the world today, I see less and less interest in the kinds of proliferation of chemical weapons than I saw a year ago, dramatically less interest, because it is not a popular thing to do.

The thing that concerns me is not so much use in war, because I honestly think that we can deal with that. We dealt with it in 1925 for a good number of years. What concerns me is the terrorist use. And conventions do not work against terrorists. You must go to the heart of the terrorist problem and root that out, whether they are using chemical weapons, nuclear weapons or anything else.

So that is a problem, and that is not a problem which is dealt with by this kind of convention.

Chairman GLENN. So you are saying the terrorist situation, then, would be outside of any convention and outside of any verification provisions or outside of our capability to take care of, then; is that correct?

General BURNS. That is true, because terrorism is outside the law. It is very difficult to blame the law against murder because someone is murdered. The law constrains that and reduces it to an irreducible minimum.

The problem, of course, with chemical weapons in the hands of terrorists is that it could be a very attractive weapon because it is cheap, it does terrify, and those are the two things that terrorists require.

Chairman GLENN. Is it possible that the fact that this capability is spreading so rapidly around the world—and I hate to even suggest this idea—but that it is becoming so common that it is going to be its own best deterrent against use, just by the fact that someone might use a similar weapon back against the perpetrator?

General **Burns**. Deterrence by possession, perhaps.

Chairman **Glenn**. "MAD" revisited on a smaller scale, "mutually assured destruction."

General **Burns**. I hate to depend upon that. I would hate to concoct another deterrent doctrine along those lines. There may be something to it, though, in the case of very widespread holding of chemical stocks. We have not reached that point yet, and I hope that we never do.

Chairman **Glenn**. Well, I am all for trying to prevent the spread, I am all for trying to verify, but I also have through the years worked on the problems of trying to ferret out even where nuclear weapons were being put together, with all the infrastructure and the scientific effort and the specialized equipment, scientific equipment that we tried to prevent the spread of with the Nuclear Nonproliferation Act back in 1978—and even with all of that that has to go into the making of a nuclear weapon, we have a lot of trouble ascertaining and verifying what is going on around the world. I think we have done better in recent years in that regard than we have even in places where we have information on what is going on; we have the Administration come in, and they verify to us, "Oh, yes, it is quite all right; we ascertain that there is nothing going on"—when they get the same briefings that I get. So I do not know that we have the will to really address the verification problem within our own country.

My time is up. Senator Levin?

Senator **Levin**. Thank you, Mr. Chairman.

On the verification issue, we are trying to control and ban the militarily significant chemical warfare capability, as I understand it. Is that synonymous with chemical warfare agents? Is it not really our goal to get to the weapons? Isn't that what we are trying to ban and to verify the banning of?

General **Burns**. If I understand your question, Senator, that is correct, because a chemical agent could be a relatively harmless gas used for commercial purposes. That agent in a bomb or an artillery shell with the appropriate delivery system is what makes it a lethal agent of war.

The first step, of course, is to eliminate the weapon of war, the artillery shell, the bomb and the delivery system. I think we have to keep in mind the delivery system is equally as important in this particular case in the Third World.

Then, to eliminate the possibility of a breakout by a country, we have to be able to limit the actual stocks of lethal agents, and this becomes quite difficult, as I said, because lethal agent to you may not be a lethal agent to me. But that is the second rung on the ladder of eliminating the capability of nations to wage chemical warfare.

Mr. **Holmes**. If I could just footnote what General Burns was saying—and I think it also goes to your first question about what is on the table now in Geneva—we are dealing with declared and undeclared facilities. Under the text that is now being negotiated, we would be seeking to destroy not only weaponized stocks, but also bulk agent and the military production facilities. This would be done after an exchange of——

Senator **Levin**. Agents?

Mr. HOLMES [continuing]. Of agents, as well—and this would be done under observation by inspectors. In addition, they are looking at ways of policing the commercial industry that does produce dual-capable chemicals. In this effort, we have the cooperation of United States industry, and it is beginning now in other countries as well, to design a way of doing that that is as effective as possible.

And we will shortly have, in fact, a pilot experiment, perhaps before the end of this month, at a site that does produce a key precursor, and there will be a team that will go through this and test this. This is the beginning of the process, I would like to emphasize, and not the end of that experiment.

Senator LEVIN. As I understand it, the verification process is more difficult for the agents than it would be for weapons or delivery systems. Is that generally a fair assessment?

Mr. HOLMES. I believe that is a generally fair assessment.

Senator LEVIN. And there is a level of risk in verification—as you testified, we cannot have perfect verification. The question is, is it adequate verification as you have defined that word "adequate." And I gather that could differ, depending upon whether we are verifying the agent or the weapon or the delivery system.

In other words, can we accept a greater risk, for instance, relative to an agent than we can relative to a delivery system or the weapon itself.

General BURNS. I think in general terms, yes, sir, we could.

Senator LEVIN. Now let me shift to something else you testified to, General Burns, and that is what we have done at the United Nations or have not done and the range of remedies the UN can decide upon, including, I think you said, ostracism and pressure and sanctions and a whole lot of other options.

Have we sought at the United Nations, relative to the use of chemical weapons in the Gulf war, more than condemnation? I can address this, I guess, to either one of you. Have we sought anything more than condemnation at the United Nations? Have we sought sanctions against Iraq?

Mr. HOLMES. No. In the aftermath of the use in the Gulf war, we sought condemnation.

Senator LEVIN. Why did we not seek sanctions?

Mr. HOLMES. There were undoubtedly a variety of reasons and other policy interests, as there always are when you look at that kind of a situation.

Senator LEVIN. I think Senator Glenn kind of put his finger right on it—your level of seriousness on this kind of an issue is mirrored by the kind of actions that you take more than by the kind of rhetoric that you utter. We did not seek sanctions although there was a clear violation and, I think, an admitted use of chemical weapons by Iraq. And I would like to know the history of the thinking here.

You were around here, I gather, Secretary Holmes; why didn't we seek to impose sanctions against Iraq? They were on the books as an available remedy. Why didn't we seek them? We may not have been successful, but why didn't we seek them?

Mr. HOLMES. Why didn't we seek—I am sorry——

Senator LEVIN. Why did we not seek sanctions against Iraq both in the Gulf war and against the Kurds?

Mr. HOLMES. Well, as I say, there were a complex of other important foreign policy and economic policy considerations that were looked at in judging what was best to do at that particular moment. This was toward the end of the Iran-Iraq war, and there were certainly other considerations involved.

I would be happy, if you would like me to, to give you in writing an account of the considerations that went into that decision.

[Information supplied follows:]

In 1988 the U.S. strongly supported UN Security Council adoption of resolutions 612 and 620 condemning illegal use of chemical weapons in the Iran-Iraq conflict. Resolution 620, adopted shortly before the ceasefire, called on the Secretary General to investigate allegations of chemical weapons use, following which the Security Council could consider further action—thus establishing a procedure under which sanctions or other Security Council action might be taken.

On September 8, 1988 the U.S. announced it had "incontrovertible evidence" that Iraq used chemical weapons in an effort to suppress Kurdish rebels. The evidence came from highly sensitive sources, and we could not share it with the Security Council. Although we urged the UN Secretary General to investigate our charges of Iraq's unlawful use of chemical weapons, a UN team was unable to conduct such a mission because both Iraq and Turkey refused to allow the team entry.

We chose to engage Iraq diplomatically to secure an end to Iraqi use of chemical weapons, and we believe our efforts met with success. In response to our statement of September 8, on September 17 Iraq's Foreign Minister announced Iraq's adherence to international law regarding chemical weapons, and later clarified personally to then Secretary Shultz that this statement applied equally to external and internal conflicts. We believe Iraq has not used chemical weapons since our statement.

As part of our larger policy of seeking to eliminate these weapons of mass destruction, former President Reagan, in his speech before the UN General Assembly last fall, called for a world conference on the 1925 Geneva Protocol on chemical weapons. This conference took place in Paris in January. Iraq participated constructively in the conference, and has since joined, as an observer, the Conference on Disarmament in Geneva, where some 40 nations are working to negotiate a global comprehensive ban on chemical weapons.

Senator LEVIN. My time is up. That would be useful if you would do that.

Chairman GLENN. Let me follow on with that now. Can you give us any indication of what these foreign policy and economic considerations were?

Mr. HOLMES. Well, I would prefer to get it in writing, Senator, because I was not directly involved in those deliberations.

Chairman GLENN. I know, and we can wait for that for the complete rundown on that, but can you give us some foreign policy issue that was at issue there that prevented us from asking for sanctions--or what were the economic concerns? We had very little trade with Iraq.

Mr. HOLMES. Well, again, I would prefer to get the facts rather than just try to recall from memory.

Chairman GLENN. Okay. I will not push you any further on that, although I think it illustrates once again that our will to really take on this issue of chemical and biological warfare is not there. When we say foreign policy--well, what is our foreign policy consideration or economic consideration? I know of no giant economic consideration in that area that was such that we could not have asked for sanctions against Iraq. If we are serious about this thing then we have to be serious about it, as Senator Levin indicates.

General Burns, how much money and effort have we put into an inspection program?

General BURNS. Do you mean a verification program?

Chairman **Glenn**. Yes.

General **Burns**. At the present time, I believe there is about $1 million a year between ACDA, Defense and DoE, going into verification matters concerning chemical weapons.

Chairman **Glenn**. We have a National Trial Inspection Program. What agencies are involved in that?

General **Burns**. This is primarily ACDA and Defense. Other interested agencies are also involved.

Chairman **Glenn**. State is involved with that?

General **Burns**. I think State has at least an observer role in that, yes.

Chairman **Glenn**. When will we have the results of that Trial Inspection Program?

General **Burns**. I imagine the results will be available, compiled by spring; they are taking place almost immediately.

Chairman **Glenn**. Why did it take us so long to get a program like that together? Why were we slow in that one?

General **Burns**. Well, one of the problems, of course, is an attempt to get other nations to do the same thing; that took a little while.

Second, this is a voluntary program on the part of industry. The Chemical Manufacturers Association has been extremely helpful in setting this up, identifying a company, and so forth. I am not sure it took an inordinate amount of time to do that.

Chairman **Glenn**. Well, you have mentioned other countries. What other countries are working on this, and what are they finding out? How do they analyze the problem?

General **Burns**. I cannot name the countries. I could provide them for the record, however.

Chairman **Glenn**. We would appreciate that.

[The information referred to follows:]

The countries involved in the National Trial Inspection Program are as follows: Australia, Belgium, Brazil, Finland, German Democratic Republic, Federal Republic of Germany, Hungary, Italy, Japan, Netherlands, Sweden, Switzerland, Soviet Union, United Kingdom, and United States.

General **Burns**. The Soviet Union is one of the countries doing this. I think there are about a dozen. They will inspect along the same general guidelines a chemical manufacturing plant in their countries and then report the successes or problems that they had with that.

There will be an exchange of information among the countries.

Chairman **Glenn**. But do you have any idea at this point as to whether they are coming up with any different——

General **Burns**. We have not seen any results yet.

Chairman **Glenn**. You have not seen any results at all or had any discussions on it yet.

General **Burns**. No, we have not.

Chairman **Glenn**. Okay. Do you have any idea of what is going to be required, moneywise, to really get into verification? Have there been estimates made on that yet?

General **Burns**. I do not have any estimates at my fingertips. I think the important thing is not to throw money at the problem but to use the money wisely. I think that the money right now really should be considered seed money. I think a lot more money is going to be required.

Chairman **Glenn**. I am sure it would. When we are talking about $1 million so far having been devoted to this, that is only study money, obviously. But as far as really, really getting into what is going to be required and fleshing out what is going to have to be done in verification I would think would be a very expensive operation.

General **Burns**. I agree with you, Senator.

Chairman **Glenn**. Mr. Holmes?

Mr. **Holmes**. Mr. Chairman, I would just like to note that the Department of Energy does have a number of small programs going in the national laboratories, and my sense is that they would appreciate some encouragement and obviously, some additional funding, to take the process further in developing sensors of the kind that can be effective in conducting monitoring of a treaty.

Chairman **Glenn**. Are they being funded out of DoE funding now and not out of ACDA funding or other——

Mr. **Holmes**. The money that is now being utilized is out of Department of Energy's funding.

Chairman **Glenn**. Okay. Maybe that is one we can help out on; we will certainly look into that.

Mr. Holmes, just one other question. The New York Times yesterday had an article about the State Department apparently considering ways of plan for focus on arms control, and it is going to combine stepping up efforts to combat the spread of nuclear weapons, chemical arms and missile technology. It would be a new plan, it would be a reorganization. What can you tell us about that this morning?

Mr. **Holmes**. I cannot tell you very much about it because the Department is in the middle of reorganizing its structure right now, and the policies for dealing with missile proliferation, chemical warfare and other arms control subjects are currently being reviewed at this very time.

Chairman **Glenn**. One of the concerns, I believe, is that some of this emphasis and effort might even be considered as downgrading it a little bit because it would put it further away from the Secretary. Is that a possibility?

Mr. **Holmes**. I would doubt that, frankly. From what I have seen and heard so far, I have the very distinct impression that Secretary Baker is extremely interested in these subjects and recognizes them as being top priority for the Administration.

In fact, I have already had one opportunity to brief him on some of these questions.

Chairman **Glenn**. Can you tell us when the State Department might be finished with this consideration of this reorganization and when we would know about it, because it is going to be very important toward getting on with General Burns' work and determining what our policy is going to be with verification and sanctions and the whole realm of things that they are going to have to deal with.

Mr. **Holmes**. I would imagine that fairly quickly, the new officials that are being proposed for these jobs, their nominations will go forward, and——

Chairman **GLENN**. What is the State Department's current definition of "fairly quickly?" A month or 2 months?

Mr. **HOLMES**. I would say within a matter of weeks; that would be my guess.

Chairman **GLENN**. Okay, fine. Thank you very much.

Senator Levin?

Senator **LEVIN**. General, in the INF and START negotiations, we first proposed unrestricted rights of challenge for inspections, and then we backed away from it because we decided they were too intrusive.

Now, in the chemical area, we have tabled a proposal that there be unrestricted challenge rights. Is it likely that we are going to back away in the chemical area from our own proposal the way we did in INF and START?

General **BURNS**. Senator, there is no such thing as an unrestricted absolute right in arms control.

Senator **LEVIN**. Is it likely we are going to back away from the quite unrestricted right that we tabled in the chemical weapons negotiations—are we going to back away from what we have tabled and offered?

General **BURNS**. Senator, I would predict that when we finally see the final draft of the treaty, it will have a very intrusive regime, but the regime will not be an absolute regime.

Senator **LEVIN**. But it will be, you believe, very consistent with what we have tabled?

General **BURNS**. I believe it will be consistent with what we have tabled; I believe it will also protect those things that the United States believes need protecting for our own national security interests.

Senator **LEVIN**. On the export control side of things, Secretary, to what extent do our European Allies have export control similar to our own? Could you give me just a quick, general statement? Is it easy to summarize the situation, or does it differ from country to country?

Mr. **HOLMES**. It is difficult to summarize.

Senator **LEVIN**. Would you give us for the record the list of our Allies and tell us which ones have tight controls, which ones less tight, which ones weak; would you just summarize that? Is there an obvious hole in some of our Allies' laws?

Mr. **HOLMES**. I would be glad to provide something that describes what the export controls are for some of the principal Allies, recognizing, for example, that the Federal Republic of Germany is apparently on the verge of passing to the Bundestaag new, tightened export controls.

[Information supplied follows:]

It is not appropriate to comment on the strength and weakness of our fellow Australian Group members control laws. However, there are ongoing efforts within the group to harmonize all export control procedures. Since 1984, nineteen Western industrialized countries have met to discuss multilateral export controls with regard to certain countries developing chemical weapons. In addition, these countries exchanges information regarding chemical weapons proliferation. Under the chairmanship of Australia, group members have agreed to impose national export controls on certain chemical weapons precursors with the goal of denying them to probable users. Members of the Australian Group also developed and shared with their respective chemical industries a CW "warning list" and have asked their industries for information in cases where export of warning list chemicals is requested by probable users. Through regular consultations, the Australian Group has attempted to improve the effectiveness of these controls and to find other measures to curb the proliferation and use of chemical weapons.

The U.S. has in place a strong system of export controls on CW agents and their precursors. Among the nineteen members of the Australian Group up to 44 chemical weapons precursors are controlled by various countries in various ways. Some nations' export controls are as extensive or more so than our own. For example, Ireland controls 40 chemicals to all destinations. The U.S., which has a more developed chemical industry, controls about the same number but in many cases its controls are specific to certain target countries. In addition, as I have indicated earlier, the U.S. is currently reviewing its whole system of export controls on CW to see if there are additional controls which we may consider.

On the whole, U.S. administration and enforcement of export controls are more comprehensive than in most countries. As international awareness of arms proliferation issues increases, other countries are working to increase the effectiveness of their controls. This effort includes not only lawmaking but law enforcement.

Senator Levin. Who has the weakest laws at the moment among our Allies?

Mr. Holmes. I cannot answer that.

Senator Levin. Are we trying to encourage all of our Allies to strengthen their laws, or just the Germans?

Mr. Holmes. No; we are encouraging all countries to do that.

Senator Levin. And yesterday Judge Webster stated that our controls—and I believe you and the General today may have concurred—that our own controls are not adequate. Can you give us a couple of examples, Secretary, as to where you would suggest improving our export controls?

Mr. Holmes. Yes. I think our controls of those chemical and biological agents and weapons elements that are on the munitions list are strongly controlled, and we can always improve that. But one area where I believe there could be some improvement is in the dual use area, those dual use chemicals and technologies which are licensed by the Commerce Department. There are certain things on the commodity control list, but there are other elements which do not require prior government control before they are exported.

As I understand it, there are certain things that are exported under a general license, and there is an ex post facto report on it. I think that is an area that deserves attention to see whether or not that should be tightened.

Senator Levin. When are you going to be giving the Congress the list of changes which the State Department is going to be supporting in this area—have you been asked for it?

Mr. Holmes. This is part of the general review that is taking place now.

Senator Levin. Have you been asked yet to give the Congress or any committee of the Congress the specific changes that you would support in our laws?

Mr. Holmes. No.

Senator Levin. Would you do that for this Committee?

Mr. Holmes. I would be happy to do it, but I would like to do it as part of the review, because I think it is very important that we coordinate with the Department of Commerce and in the context of the review. Once it has been completed, then I would suggest that that would be the appropriate time to submit suggestions.

[Information supplied follows:]

On the recommendation of the Secretary of State, on February 23, 1989, the Commerce Department announced that it will impose foreign policy export controls on 23 chemicals and five classes of biological agents that can be used in the manufacture of chemical and biological weapons. This will bring to a total of 40 the number of chemicals whose exports are controlled by the United States.

This total is by no means final, we are currently discussing whether to control some or all of these chemicals on a worldwide basis. The U.S. government will continue reviewing its export controls policy on chemical and biological agents that have military application.

The controls are being imposed under the foreign policy provisions of the Export Administration Act. This Act authorizes the Commerce Department, based on the recommendation of the Secretary of State, to announce and administer export controls to further U.S. foreign policy objectives or to fulfill international obligations.

Based on our recommendation, the National Security Control List has been updated and the ITAR now include key components of the binary weapon system. The feasibility of placing controls on CW-related technology is also being pursued by the Commerce Department.

Senator LEVIN. Have you gotten your time line on that one this morning?

Mr. HOLMES. No.

Senator LEVIN. Could you give it to us—days, hours, minutes?

Mr. HOLMES. I think more a question of weeks.

Senator LEVIN. That one is weeks; okay. I ought to phrase my question more often, "days, hours, minutes" because I thought you would say months on that one; weeks is fine.

Has the State Department taken a position on the bills that have been introduced relative to sanctions on countries or on foreign companies that are trading in chemical or biological agents? There are at least three bills that have been introduced, and they are important bills and have a lot of bipartisan support. Have you taken a position on them?

Mr. HOLMES. We have not taken a position on them, but we are becoming familiar with the content of those bills, and that is also part of this review.

Senator LEVIN. Thank you.

Thank you all.

Chairman GLENN. Thank you.

Let me ask one other question on sanctions; we will talk about that for just a moment.

General Burns, from your comment, I gathered that the only route we are pursuing right now as far as sanctions is trying to get a UN agreement; is that correct?

General BURNS. No, I would not put it quite that narrowly, Senator. That is certainly the multilateral approach, I think, which we would prefer right now. I think that there are other things the United States could do and can do in dealing with these problems from our own national security point of view.

Chairman GLENN. We know if we go at this through the UN—we know the attitude of many of the smaller nations in the UN. They view this as the poor man's nuke, as the big equalizer for them, and I think you are going to find just delay by whatever mechanism on getting this, and I doubt that—well, I do not know whether we would get agreement through the UN or not.

But certainly, the leading industrial nations of the world should be concerned enough about this and should have enough impact on the rest of the world that if we got a multilateral agreement that we took the lead on, we went out, we put it together, meanwhile continuing UN efforts, but do not let that be our only effort, it would seem to me that that is the way we should go in trying to get that kind of an agreement.

Is that being pursued at all? I will ask you and Mr. Holmes both.

General BURNS. Well, in this broad area of proliferation, we have a number of bodies working. First of all, in the chemical side, the Australian group, which has had quite a bit of success in coordinating voluntary national efforts among the countries with developed economies—20 nations, in fact. We have——

Chairman GLENN. Now, 20 nations to do what—prevent the shipment of materials?

General BURNS. Prevent the shipment of specific chemical precursors, chemical agents and dual-use chemicals.

Chairman GLENN. That is in the prevention area, but then we are working on verification. Let us say we get verification. Then I am concerned about what we do with sanctions so that nations really have to think twice before they use this stuff or before they consider going down this route of manufacture.

General BURNS. Well, that is the third step, and we have not gotten there yet, quite frankly. And the reason we have not gotten there, in my view, is that nations have got to satisfy themselves that they are not going to be all alone on this. In other words, if they can control the spread of precursors, if they can control the spread of weapons, if they can come up with an adequate verification regime, then they will be much more willing to impose unilateral, multilateral or sanctions under the United Nations.

Chairman GLENN. Mr. Holmes, do you think we are willing to take the lead in this as far as sanctions?

Mr. HOLMES. Well, I think that at some point we are going to have to deal with that subject, but——

Chairman GLENN. Well, the question is are we willing to take the lead on this; do we think it is that important?

Mr. HOLMES. We certainly think it is important—we think it is extremely important to deal with this problem. As far as the question of sanctions are concerned, since that is a major part of the review that we have underway right now and is contained in various ways in the legislation that is being prepared, I would prefer to wait until we have completed our review before responding to that.

Chairman GLENN. Okay.

General BURNS. Senator, one of our goals at the Paris Conference was to include language concerning sanctions, and in our final declaration, we were able to include language which—let's face it—was watered down, but did refer to sanctions. So I think it is the policy of the United States to push for sanctions.

Chairman GLENN. Well, okay. And I would hope that that is our policy that is fleshed out and activated today better than it has been in the past, because Senator Levin was questioning, and as I followed up on his questions, for our own foreign policy or economic concerns, here we had people being killed by chemical weapons, and we considered this and considered what we would do about it, and we did nothing. All we did was issue press releases that it was a bad, bad thing, and that is as far as it went. And I do not know whether we would go any further if there was more use around the world or not.

I would hope that we would have some sanctions that would mean something and would mean real cut-offs—I mean if somebody violates this from now on, there would be a cut-off of communications, of tourism, of travel, economic embargoes, things that could ratchet on different levels of whatever the violation was, but they would be there, and they would know without fail that that is what is going to happen.

It just seems to me that without something like that that happens to the people who transgress in this area, unless you have something like that that is going to mean something, why, the rest of this is going to be pretty much semantics and talk and business as usual.

I have been fighting nuclear proliferation for a long time; the concerns about the global spread of nuclear weapons have been one of my biggest concerns since I have been here, and we keep revisiting that subject over and over, but I must say that in looking at this over the last 6 or 8 months or a year, in this and other forums where we have discussed this in the past with some of you at the table, that this to me has the possibility or the potential for being even more important than the nuclear proliferation around the world, because it goes to smaller and smaller nations. We will find these things being used in border wars that to the big world is not all that important, but to people along those borders, it is every bit as important to them as Soviet/American relations are to us; and we are going to find these things used, and it will be bad all the way around, obviously.

Future hearings will be held on this. We do not have dates specifically set yet. We will have later hearings on this, particularly with regard to our own Nation's involvement, what export controls we are going to have. We know that the Germans are moving to tighten up some of their very lax laws. I had a visit a couple of days ago from a German delegation pursuant to meetings and some comments we had regarding their situation at Vercunda a couple of weekends ago at that meeting, which is an informal meeting over there. But they responded to that, and they gave me quite a detailed list of things that they are going to be doing in their own government to try and tighten up. And we want to see that, but at the same time, I think if there is a moral obligation—we have discussed morals of armaments earlier here—but I think if we have a moral commitment to this world, it is to see that we try and prevent the spread of these things and try and make sure that anybody who transgresses and uses them is dealt with and dealt with immediately.

Senator Nunn asked me to read into the record the following statement:

> I have a series of exhibits numbered 1 through 17 which I would like to have included in the final hearing record. They include numerous statements, charts and other materials pertaining to the issue of chemical and biological weapons. I would like these exhibits to be printed in the appendix of the hearing record, to be made available in the files of the Committee.[1]

Without objection, they will be received into the record.

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[1] The exhibits referred to start on p. 529.

Finally, Senator Nunn asks that the record remain open for 10 days pending the receipt of outstanding responses of information. Without objection, that will be done, obviously.

So thank you, gentlemen. We appreciate you being here this morning.

The hearing will stand in recess subject to the call of the Chair.

[Whereupon, at 12:10 p.m., the Committee was adjourned.]

EXPORT CONTROLS OVER CHEMICAL/BIOLOGICAL WEAPON MATERIALS: ORGANIZATIONAL CHALLENGES FOR THE 1990's

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TUESDAY, MAY 2, 1989

U.S. SENATE,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
AND ITS
PERMANENT SUBCOMMITTEE ON INVESTIGATIONS,
Washington, DC.

The Committee and the Subcommittee met, pursuant to notice, at 9:45 a.m., in room 342, Dirksen Senate Office Building, Hon. John Glenn, Chairman of the Committee, presiding.

Present: Senators Glenn, Nunn, Levin, Kohl, Lieberman, and Heinz.

OPENING STATEMENT OF CHAIRMAN GLENN

Chairman GLENN. The hearing will be in order.

A few years ago, the words, "poison gas," "germ warfare," and "toxin weapons," seemed remote to most Americans and our allies. The news of Libya's chemical weapon facility and the horrors of the Iran-Iraq War, along with the thoughts of what might happen if some of these weapons were developed or fell into the hands of terrorists, have served to remind us all of the urgency of the problem we are facing from the further proliferation of such weapons and the technology for producing them.

On February 9 and 10, the Governmental Affairs Committee and the Permanent Subcommittee on Investigations held their first joint hearings to determine the scope of this problem.

Today we continue this series with an examination of how well our export controls are working to prevent the spread of materials and technology used in the production of such weapons.

Since U.S. controls do not exist in a vacuum, we will also examine how well international controls appear to be working.

Some people may argue that the task facing our Nation is utterly hopeless. We heard CBW experts testify at our February hearings that primitive but credible weapons could be made using very simple, readily available materials, which happen also to be inexpensive, and using basic science from published textbooks.

Now, unlike nuclear materials, whose production requires large and more easily detectable facilities, many so-called precursor materials for CBWs could either be imported in open commercial sales or can already be manufactured in a variety of countries now thought to be seeking such weapons.

Since many of these materials have common civil uses in the textile and chemical industries, and are exported globally in the thousands of tons each year, it is extremely difficult to assure that any given shipment of chemical or biological material may not be diverted for illicit uses.

Thus, no matter how careful we or our trading partners are, export controls alone cannot be expected to solve all of our proliferations problems. No conceivable trade control system could provide perfect confidence that sensitive technical data or small quantities of CBW-related materials will not find their way into the hands of a terrorist group or nation determined to acquire or produce such commodities.

Does that mean that export controls are not important?

No, of course not.

First, we are seeing continued efforts by would be proliferators to acquire basic materials and technology on the world market, often using complicated schemes involving middlemen, transshippers, laundered money, front companies, and many of the same type of shady procurement techniques that Pakistan has been using to acquire materials for its nuclear weapon program. If CBW materials were so easily available, such complex purchasing schemes just would not be necessary.

Many of the CBW facilities throughout the Middle East remain dependent upon foreign expertise and know-how.

I look forward to today's testimony from the Commissioner of Customs, William von Raab, about how some of these materials were acquired from the United States for use in the Middle East, and how Customs has responded to such shipments.

Second, the United States has shown leadership in urging our allies in Europe and Japan to tighten up their export controls. We must take great care, however, to assure that we have our own house of export controls in order if we wish to sustain this diplomacy to its desired ends. So far, we have been fairly lucky. There have not been many publicly, at least, reported cases where sensitive U.S. materials or technology have turned up in illicit foreign CBW-related programs.

It does not give me any great comfort, however, to know that there are hundreds of drums of American thiodiglycol, a precursor material for mustard gas, that are now sitting in CW factories in Iran and Iraq awaiting conversion, or that have already been converted into that deadly poisonous gas.

The difficulty of controlling this chemical arises from its many commercial uses, quite legitimate commercial uses, which include applications in textiles and the ink in your ballpoint pen that you may well have in your pocket right now.

As for other supplies, I suspect that, if we got inside some of the world's most secret CBW-related facilities, we would probably find evidence of a variety of industrial, electronic, and material goods that were stamped, "MADE IN THE USA."

Should our controls be tightened?

In testimony before this Committee on February 9, CIA Director William Webster was asked if he thought existing export controls were adequate. His response was: "Probably not."

He added, however, that it is unlikely that U.S. firms have been acting wittingly as suppliers to foreign CBW programs. Even so, we clearly need to be more careful about monitoring the end-uses and end-users of exports that could contribute either directly or indirectly to illicit CBW programs.

The goals of our CBW-related export controls must remain firm—to deny supplies to illicit end-users to raise costs of illegal acquisitions, and to deter violations by education and the prospect of tough penalties, reliably enforced.

How we actually pursue these goals is the subject of this hearing. We will hear from the Commerce Department and the Customs Service about how they manage the very complex tasks of licensing CBW-related exports and enforcing existing regulations.

We will hear from the State Department about where we stand relative to the global regime of CBW export controls.

And we will also hear three contrasting perspectives from the private sector: from Paul Freedenberg, who has just left his position as Undersecretary of Commerce for Export Administration; from Richard Perle, former Assistant Secretary of Defense in charge of the Department's Nonproliferation and CW Arms Control Activities; and Max Turnipseed, an international trade specialist with the Chemical Manufacturers Association.

Are America's export controls effective?

Are they being efficiently administered?

Are we getting good cooperation from other supplier Governments in implementing tough export controls in the CBW area?

Are the controls in force in other nations adequate to reduce the risk of proliferation?

Are we making best use of the expertise from the private sector, while avoiding problems of conflicts of interest?

These are just some of the questions we'll be asking today.

I hope that, as a result of this hearing, we will be able to identify some specific improvements in our system of export controls, so we can avoid the prospect of a world armed with chemical and biological weapons.

Are there any other opening statements?

Senator Nunn?

Senator NUNN. Mr. Chairman, you covered it very well. I have an opening statement, but I will just request that it be put in the record.

Chairman GLENN. Without objection, so ordered

Senator Heinz?

[The opening statement of Senator Nunn follows:]

OPENING STATEMENT OF SENATOR NUNN

Today the Committee on Governmental Affairs and the Permanent Subcommittee on Investigations will continue their joint efforts in examining the problems posed by the spread of chemical and biological weapons. In joint hearings held in February we learned not only of the devastating effects of these weapons, but also of the rapid rate at which these weapons have begun to proliferate throughout the world. This morning's hearing will concentrate on how the use of export controls can, hopefully, slow that proliferation.

In January of this year, 149 nations, including the United States, joined together to declare that they were "gravely concerned by the growing danger posed to international peace and security by the risk of the use of chemical weapons as long as such weapons remain and are spread." If we are to stand firm in our resolve against the spread of chemical weapons we must maintain a constant vigilance to ensure that the material, technology, and expertise necessary to develop such weapons does not fall into irresponsible hands. The imposition and enforcement of export controls in this area has thus become an important means of maintaining international peace and security.

As we learned in our previous hearings, countries such as Libya and Iraq have acquired their chemical weapons capability as a result of the purchase of chemicals, equipment, and expertise from Western countries. CIA Director Webster told us during those hearings that: [a]ssistance provided by foreign suppliers—many of whom were fully witting of the intention of the Middle East countries to produce chemical weapons—has been the key element that has enabled these nations to develop a capability to produce chemical weapons within only a few years.

Indeed, news reports over the course of the past year have at various times cited individuals and companies from West Germany, Japan, Belgium, the Netherlands, Italy, Switzerland, and France as having supplied vital precursor chemicals and/or specialized equipment for use in chemical weapons plants. Here in the United States, a chemical manufacturing company in Baltimore, Maryland pled guilty to involvement in an arrangement whereby hundreds of tons of a precursor chemical were exported in violation of the export Administration Act, ultimately ending up in Iran and Jordan. And in Newark, New Jersey, a U.S. citizen was charged with participating in a conspiracy with a British businessman and a South Korean trading company to purchase and export 125 tons of nerve gas which was believed to have been destined for the Middle East.

Clearly, there is a need, not only in this country, but throughout the industralized world, for strong export control laws which will be strongly enforced. Recently, encouraging steps have been taken in this regard. In February, West Germany undertook what it called a "drastic tightening" of its export controls on chemical, biological, and other weapons material. Also in February, the twelve European Community foreign ministers unanimously agreed to ban foreign sales of eight chemicals "if there are grounds for believing that the products could help the development or manufacture" of chemical weapons. And, since 1984, the government of Australia has convened a series of meetings of twenty Western industrialized nations, informally known as the Australia Group, to coordinate export controls over chemical weapon precursors.

As we applaud the actions of our allies, we must also take stock of our own policies and procedures on export control. During our hearings in February, Judge Webster testified that U.S. laws are probably not adequate to block the deliberate export of equipment and chemicals needed to manufacture chemical weapons. In March the New York Times reported Bush Administration officials as acknowledging that U.S. export controls have many of the same deficiencies as those for which we have called our Western European allies to task. One of the major officials quoted in the *Times* article, Mr. Paul Freedenberg, will be testifying here this morning. I look forward to his testimony on this critical point.

There is clearly a monumental task facing those agencies responsible for detecting and preventing violations of our export control laws. The massive amount of license applications which are filed every year force licensing authorities to rely primarily on a paper review to detect suspect shipments. Despite the sophisticated system which has been implemented by the Commerce Department to screen license applications, an exporter willing to falsify his documentation, or one working through a complex network of dummy corporations and middlemen, could probably obtain a license to export many of the ingredients necessary to produce a chemical weapon.

It is also clear that although this country exports hundreds of millions of dollars worth of goods every year, the resources devoted to enforcing export control are miniscule. Customs officials have candidly admitted that they are able to inspect only one to two percent of all goods exported from this country. For the most part export enforcement is limited to reviewing an exporter's shipping documentation. In some instances though, that documentation may not even be required until days after an exporter's ship has already sailed. One might well ask whether our current system of export controls merely keeps the honest shipper honest, while allowing those with true criminal intentions to avoid detection.

Complicating this problem is the fact that we have multiple agencies charged with the same, or similar, missions in this area. In licensing, the Commerce Department, the State Department, and the Defense Department all play major roles. As originally conceived, those roles were all supposed to be slightly different. The Commerce Department was to be responsible for those items of a dual-use nature; the State Department was to be responsible for those items of a single military use nature; and the Defense Department was to advise on potential conflicts between licensing applications and national security objectives. Only a few weeks ago, however, the Defense News reported that those roles may be changing: the Commerce Department can be expected to have a major stake in high-technology development initiatives, a role previously designed for the Defense Department. The department is expected to be more active in export control and in licensing the export of defense-related products, heretofore State Department turf. (April 17, 1989)

In enforcement, the Customs Service and the Commerce Department continue to carry out duplicate missions in investigating alleged violations of the Export Administration Act. We have also begun to see some duplication of efforts between the Customs Service and the Department of State in investigating alleged violations of the Arms Export Control Act.

In hearings held by the Permanent Subcommittee on Investigations in 1982 and 1984, I expressed my concern about bureaucratic in-fighting and turf battles in the enforcement of export controls. I said then, and I repeat today, that needless competition between agencies is counterproductive. Government agencies must work together to ensure that those materials necessary to the production of chemical weapons do not fall into the hands of our adversaries, or of irresponsible parties. I hope that those agencies testifying here this morning will address this situation.

We face many difficult choices in this area. This country has endured record trade deficits for a number of years. At the same time, many of the materials we seek to control are available from other countries. I believe, though, that in the area of chemical and biological weapons the United States must lead by example. We must review our own export control regime, making corrections where indicated, and we must work in cooperation with our allies in tightening export controls worldwide. We must strive togther to ensure that the chemicals and technology which provide our world with the conveniences of the modern age are not perverted to the destruction of mankind.

In closing I would like to thank Senator Glenn and the staff of the Governmental Affairs Committee and Senator Roth and the minority staff of the Permanent Subcommittee on Investigations for their efforts in connection with this issue. I look forward to the testimony of today's witnesses and I look forward to continuing to work with Senator Glenn, Senator Roth, and the rest of my colleagues as we seek ways to address this problem.

OPENING STATEMENT OF SENATOR HEINZ

Senator HEINZ. Mr. Chairman.

First, Mr. Chairman, let me commend you on these hearings. And, in listening to you and in looking at our witnesses, I'm compelled to observe that this is a very useful exercise, but the problems are growing, even as we try to catch up with where we are.

I am reminded that on April 9, in Tbilisi, the capital of Soviet Georgia, television cameras once again brought into our living rooms the horrifying aspects of chemical agents used on the civilian population.

During police efforts to break up a nationalist demonstration, at least two deaths were attributed to the use of a gas, according to Soviet officials, contained in chlorocetophenone, or phenacetin chloride. That is a synthetic chemical that can cause severe damage to internal tissues as well as eye irritation and headaches, depending on the dose. It can also be fatal. Some 70 children were treated for injuries related to that gas.

And that incident raises questions about the recent Soviet commitment made in Paris in January to destroy unilaterally its chemical weapons inventory. Even more, however, it reminds us once again, as did the savage and genocidal use of poison gas during the War of the Cities, that it is past time for civilized nations to eliminate these debilitating and horrifying agents of destruction voluntarily and immediately.

And I don't think we can afford to wait until more people die.

The destruction of all chemical weapons stockpiled is, of course, a complex problem requiring time and resolve to achieve. Indeed, our country has one of the largest stockpiles in the world. Controlling the spread of the precursors and agents is something that can be accomplished in a much shorter time period, however.

These hearings, to assess the adequacy and effectiveness of U.S. and foreign exports over chemical and biological weapons, are timely and a step in the right direction. Given today's witnesses, I am confident that the hearing will produce an informed examination of U.S. export control problems and prospects; and, judging from some newspaper stories on the subject matter, that examination has already started.

But these hearings are also timely in a symbolic way. Today a U.S. Federal Court in Newark, New Jersey, will start the trial of a South Korean entrepreneur, who tried to acquire sarin nerve gas bombs. We will, of course, anxiously await the outcome of that trial, but we have, in the meantime, much hard work to do and decisions to make.

What is becoming increasing clear, at least to this observer, is that our export control program is in disarray. That, of course, is intolerable, and it must be fixed.

And I am especially concerned, Mr. Chairman, with the great number of Third World Countries, 20 by some count, that are actively seeking chemical precursors and agents from missile delivery systems. And I can't think of anything more terrifying than missiles equipped with chemical warheads in the hands of well-known terrorist groups supported by terrorist countries on our foreign policy control list—specifically, Iran, Iraq, Syria, and Libya.

But I am perhaps most dismayed by the lack of a multi-lateral effort to deal with chemical weapons. This is not simply an American problem; it is a global problem. I fear that unilateralism will not, and has not, worked; and that only multilateralism will.

Controlling the spread of these weapons will require, at least in my judgment, a collective vision of what kind of export control system will be needed in the next 10 years, when those same 20 countries seeking chemical agents may have developed their own indigenous missile delivery systems.

So that, in fact, adds greater urgency to today's hearings.

I would like to make a suggestion: it seems to me that a useful place to begin constructing a multilateral vision is with the Australia Group, the only international organization dedicated to preventing the spread of CBW weapons. That Group, by the way, includes all the members of NATO except Greece and Turkey, all EC–12—Japan, Australia, New Zealand, Switzerland, Austria, and Sweden pending.

And I strongly believe that this group must take the necessary steps to transform itself from an informal group to a formal organization with a decision-making structure to meet the challenges of the next decade.

And so what I would hope we could persuade the Australia Group to do would be this:

First, move its headquarters from Canberra to Paris now that Australia has become a member of COCOM.

Second, transform its ad hoc secretariat into an international secretariat modeled at the very least on the COCOM secretariat.

Third, move away from its rule of unanimity to one requiring no less than a two-thirds vote; and I would love COCOM to consider that recommendation as well.

And finally move towards binding decision-making.

I hope our witnesses, Mr. Chairman, will comment on these suggestions today. The task we've got before us is very serious, and after the Tbilisi incident, we can't afford to wait much longer to make much more progress on destroying chemical weapons.

Thank you.

Chairman **GLENN**. Thank you, Senator Heinz.

Senator Kohl, or Senator Lieberman?

Either one.

Senator Lieberman?

OPENING STATEMENT OF SENATOR LIEBERMAN

Senator **LIEBERMAN**. Mr. Chairman, if I may, very briefly, to thank you for convening these hearings.

As I participated in the first round of these hearings, it struck me very powerfully again that the threats to American security and, indeed, the threats to world security, in the years ahead, may come not from some of the places that we have been accustomed to expecting them, but from some unexpected places, and we are right at the center here in our discussion of chemical and biological weapons.

In an earlier incarnation, I had the opportunity to write a study about the first attempts to control atomic weapons at the end of the Second World War, and it seems to me that we are at a comparable period in terms of the development of this new generation of chemical and biological weapons and our ability to deliver them with ballistic missiles.

The tragedy of that period of time, in the mid- to later forties into the early fifties, was that the nations of the world, including the major powers are unable to disenthrall themselves from their own general foreign policy suspicions and hostilities to act and try to curtail the spread of nuclear weapons, and that's part of why we are where we are, and where we're trying to pull back from right now, finally, after these many years.

I hope, as you, Mr. Chairman, and Senator Heinz have indicated, that we lead to some meaningful multilateral international negotiations that will give the world some sense of security about chemical and biological weapons.

But it's very important that the United States, when we go to those multilateral negotiations, goes with clean hands; and I think the best way for us to go with clean hands is to unilaterally act, to do whatever we can to control the export of the materials of death that can be used in chemical and biological weapons.

That's why I think these hearings are so critical.

I hope that the witnesses that we hear will help us make judgments on some key questions such as these. And I pose four questions briefly:

One, is the Defense Department, State Department, and Central Intelligence Agency going to plan an adequate role in the interagency review of chemical and biological materials?

Shouldn't we restrict the sale of equipment that is needed to make chemical gas, in addition to prohibiting the sale of the chemicals themselves?

Shouldn't our laws allow the United States to pursue Americans who broker deals overseas for materials for Third World poison gas plant?

And, finally, shouldn't we make sure—what can we do to make sure that U.S. enforcement personnel who are in charge of inspecting possible contraband shipments have adequate technical expertise.

I look forward to the answers to those and other questions.

And, again, Mr. Chairman, I thank you for convening these hearings.

Chairman GLENN. Thank you very much.

Our lead-off panel this morning, we'll have first The Honorable William von Raab, Commissioner, the United States Customs Service; accompanied by representatives of the offices of Enforcement, and Inspection and Control.

And, who is with you, Mr. Raab, so that we will have it for the record here?

Mr. VON RAAB. Mr. Chairman, Jack Kelley, the Director of our Strategic Investigations Division, is at my right.

Secondly, Mr. James LeMunyon, Deputy Assistant Secretary for Export Administration of the Department of Commerce; accompanied by representatives of the Office of Export Enforcement and Export Licensing.

And, Mr. LeMunyon, what is—Mr. Baird?

Mr. LEMUNYON. On my right is Iain Baird, Director of our Office of Export Licensing; and directly behind Iain is Ben Oberholtzer, our Director of Office of Export Enforcement.

Chairman GLENN. All right, good. If he would want to pull a chair up there to the table, too, that's fine with us.

Mr. Roger Harrison, Deputy Assistant Secretary, Bureau of Politico-Military Affairs, Department of State; accompanied by Mr. Paul Wisgerhof, Office of International Trade Controls, Bureau of Economic and Business Affairs.

Gentlemen, we welcome you this morning.

Mr. von Raab, if you will lead off, we will appreciate your statement either in an abridged version, or in its entirety. Any of your statements, this morning, we welcome shortening them up. Your entire statements will be included in the record, however, without objection.

TESTIMONY OF WILLIAM VON RAAB, COMMISSIONER, U.S. CUSTOMS SERVICE, WASHINGTON, DC,[1] ACCOMPANIED BY JACK KELLEY, DIRECTOR OF STRATEGIC INVESTIGATIONS DIVISION, AND JOHN McGOWEN, DIRECTOR, OFFICE OF INSPECTION ENFORCEMENT LIAISON

Mr. VON RAAB. Mr. Chairman, I am pleased to be here before you and your Committee to discuss Customs' role in the enforcement of export controls on chemical and biological agents.

I testified last before your Committee in May of 1982, on export enforcement issues. Since then, the U.S. Customs Service has played an essential role in the enforcement of our export control laws.

We have worked very closely with the Permanent Subcommittee on Investigations under Senator Nunn, and under its previous head, Senator Roth; particularly closely with the staff of that subcommittee in continuing to try to improve our efforts to have an effective and efficient export control system. And I thank that committee particularly for the support that it has shown in the entire export enforcement effort.

Our Exodus program, as we call it, evolved from a basic, reactive operation, and is now highly structured, complex, and efficient.

Our results have elevated Customs to an unprecedented level of national and international enforcement prominence. I reported to you in 1982 that we had 125 inspectors, 50 special agents, and 25 support personnel, working exclusively on Operation Exodus.

Currently, we have slightly fewer inspectors—104, largely because we learned to do our job a little better, but, more importantly, instead of 50 agents we have 300 agents, and a whole independent Intelligence Branch assigned full-time to this effort.

In addition, of course, we have available and use on a day-to-day basis over 5,000 other inspectors and 2,500 other special agents.

We have also established 19 overseas offices in 15 foreign countries. Also, an increase over those which we had committed to this effort before. Each of those offices is staffed with experience investigators who work with our counterparts to obtain the necessary information on potential violations or diversions.

We have established specialized training programs for both of our inspectors and our special agents in this field. We have also included introductory training courses into all of our general training programs for our inspectors, agents, and supervisors.

These efforts, I am pleased to say, have resulted in over 1,000 arrests, 7,000 seizures valued at over a half billion dollars.

The export program encompasses all potential export violations. We have not dedicated specific resources to any one aspect of export control, including chemical and biological warfare, but we attack the problem as a whole because it has comparable characteristics.

We chose to do this because the methods and diversion routes are not unique to any particular type of merchandise, and the skills and expertise that our people have are applicable to all types of export violations.

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[1] See p. 378 for Mr. von Raab's prepared statement.

For this reason, some of my comments today are not specifically related to chemical and biological warfare, but applied to them.

I assure you, however, that all of our efforts, in both the inspection and investigative areas, are aimed at discovering and preventing as many illegally exported shipments of chemical and biological warfare agents as possible, and, of course, to bring those responsible for such actions to justice.

Additionally, we have established something called "Project Gemini," which is our industry awareness program, designed to inform industry of our export controls and solicit, I must say quite effectively, their cooperation in our endeavors. I must salute industry for their effort to support our general Exodus Program.

The prevention of shipments to illicit end-users of chemical and biological agents is a cooperative effort, and requires the involvement of all of those concerned, including, obviously, the industry.

The export controls current in place provide a restriction honored by the law-abiding firms, but, of course, will not deter the witting violator who sees a handsome profit if his gamble is successful.

As recently publicized by the news media, the U.S. Customs Service has major ongoing investigations which have reached international proportions involving the diversion of precursors used in chemical warfare by Third World countries.

U.S. manufacturers have been targeted by international brokers and middlemen retained by these proliferation countries and are using various techniques to circumvent the existing export controls applied by the United States.

I thought it would be useful, and we have some charts up here,[1] just briefly to describe and discuss a few of the investigations to illustrate the complexity involved.

First, on my right, is the Alcolac case. This was initiated in April of 1988.

I might point out most of these cases are quite recent, so this isn't old news, as it were.

This investigation led to the arrest in July of 1988, of Peter Walaschek, a German national, who purchased three shipments of thiodiglycol between 1987 and 1988 for shipment to Greece and Singapore, and then reexported them to Iran.

Walaschek, who represented the West German firms, Colimex and Chemco Gmbh, was arrested after Customs agents in Baltimore became suspicious of his third purchase, an order of 120 tons of thiodiglycol, and directed Customs inspectors in Norfolk, Virginia, to seize the chemical and substitute water in its place.

The agents allowed the shipment to proceed to Singapore, its supposed destination. Federal agents in Asia tracked the shipment, as it was transshipped from Singapore to Karachi, and then to Bandar Abbas, Iran, where it arrived on the 1st of July, 1988.

On the 5th of July, search warrants were executed at three Maryland offices of Alcolac. Based on information obtained from these searches and additional documents seized in Germany, an indictment was returned against Walaschek by a Federal grand jury in Baltimore.

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[1] See pp. 519-522 for charts discussed by Mr. von Raab.

Walaschek was lured into the United States, and arrested on July 27 at Baltimore-Washington International Airport. He later plead guilty to violating the Export Administration Act by reexporting thiodiglycol from Singapore to Pakistan, and, of course, from Pakistan to Iran.

Walaschek admitted purchasing the chemical at the direct request of Sayed Kharim Ali Sobhani, an Iranian diplomat stationed at the Iranian Embassy in Bonn. In December of 1988, Walaschek fled from a halfway house while awaiting sentencing and is currently a fugitive in West Germany.

This investigation further revealed that Alcolac exported four shipments of thiodiglycol through a New York company known as Nu Kraft Mercantile Corporation and Industrial Procurement Corporation. These shipments were exported and subsequently diverted to Iraq, this time.

Search warrants were executed on January 27 of this year, on Nu Kraft Mercantile Corporation, Brooklyn, New York, and arrest warrants were unsealed on the 30th of January for Frans van Anraat, a Dutch citizen, and Nicholas Defino, a resident of New Jersey.

Each was charged with three counts of illegally reexporting thiodiglycol from Antwerp to Jordan; three counts of false statements on the shipper's export declarations filed with Customs; and one count of conspiracy to violate the Export Administration Act.

Van Anraat was arrested by Italian authorities on January 26 in Milan, and is being held pending extradition. Defino surrendered to Federal officials in Baltimore on January 30, and was released on half a million dollars bail.

The investigation disclosed that between November of 1987 and March of 1988, Nu Kraft Mercantile Corporation, of which Defino is a principal, purchased four shipments of thiodiglycol from Alcolac, each weighing in excess of 100 tons.

These shipments were forwarded to Antwerp, where they were to be forwarded by van Anraat, Nu Kraft's European agent, to his customers in Western Europe.

At least three of the four shipments were transshipped from Alcolac to Jordan rather than to Western Europe, as Defino and van Anraat had represented.

Alcolac had entered into a plea agreement with the U.S. Attorney's office in Maryland and on February 10, plead guilty to one count of knowingly violating the Export Administration Act for the April 20 sale of thiodiglycol to Colimex of West Germany.

On February 13, 1989, Leslie Hinkleman, an export manager of Alcolac, plead guilty to one count of making a false statement and agreed to cooperate fully with the investigation.

Sentencing of both parties has been delayed until the full extent of their cooperation has been determined.

On March 23, 1989, the Federal grand jury in the District of Maryland returned two separate superseding indictments. The first was a superseding 12-count indictment charging Sobhani and Walaschek with violations of the Export Administration Act from making false statements and money laundering.

It seemed woven throughout the fact that we have to apply all kinds of laws that we have in order to get to these individuals.

Walaschek is also charged with failing to appear at his sentencing in the U.S. District Court of Maryland.

The second indictment, also 12 counts, charges van Anraat with violations of the Export Administration Act, for making false statements and money laundering.

Van Anraat is currently incarcerated in Milan, pending extradition to Maryland for prosecution. Walaschek is a fugitive, and efforts are being made by the Department of Justice to have him extradited to the U.S., or at least tried in West Germany. Sobhani's current whereabouts are unknown.

The *Sarin* case—on January 12, 1989, U.S. Customs agents arrested Juwhan Yun, President of Komex International, Short Hills, New Jersey, and charged him with conspiracy to export the nerve gas, sarin, in violation of the Arms Export Control Act.

Yun is a U.S. citizen of Korean descent. We also charged in the conspiracy Charles Caplan, a British citizen, who was Yun's associate. Caplan was not arrested and he remains a fugitive.

This arrest was the result of a 7-month undercover investigation conducted by the Special Agent in charge, Newark. Yun began to negotiate with a Customs undercover agent to purchase and illegally export sarin in November of 1988.

Sarin is described as a colorless, odorless gas that can kill by inhalation, ingestion, or absorption through the skin.

Yun was attempting to purchase 500 mark 94 bombs, each would have contained 108 pounds of sarin. Sarin is lethal in dosages as low as 1.7 grams. The export of sarin from the U.S. is controlled under category XIV(a) of the U.S. munitions list. Its exportation requires a license issued by the Office of Munitions Control, The State Department.

Interestingly enough, during the investigation, Yun also attempted to purchase L.A.W. rockets, TOW missiles, Stinger Missiles, and other munitions list items. The investigation revealed that Yun was familiar with the Office of Munitions Control licensing requirements and was attempting to obtain false "end-use certificates" to conceal the ultimate destination of the sarin and other items.

On January 20, a grand jury sitting in the District of New Jersey returned a two-count indictment against Juwhan Yun and Charles Caplan, charged them with conspiracy to export sarin in violation of the Arms Export Control Act.

Based upon a ruling by the 3rd Circuit Court of Appeals, Yun has been detained pending trial. As Senator Heinz indicated, the trial began today.

The complexity and sensitivity of this investigation required the cooperation of a number of U.S. and foreign law enforcement agencies. Assistance was provided by the U.S. Department of Defense, United States Army, Navy, the Naval Investigative Service, Her Majesty's Customs and Excise, and the U.S. Customs Service, located in London, Paris, Seoul, Honolulu, and Los Angeles.

In addition to the specific investigation I just described, the Customs Service is currently participating in three different U.S. interagency working groups concerning the export control of chemical and biological agents. The groups are being chaired by the Department of State, with participation by other concerned U.S. agencies.

In furtherance of interagency relations, our operation Exodus command center performs a communication and coordinating function in support of the regulatory and enforcement responsibility of the various U.S. Customs Service components involved in export control.

The Command Center communicates with licensing authorities in State and Commerce, through Customs officers assigned full time to those departments. The Command Center also has direct contact with the Department of Energy and Treasury's Office of Foreign Assets Control on licensing matters.

Industry sources, the intelligence community, and other enforcement agencies, and various other data bases are also at their disposal.

Our Strategic Investigations Division maintains liaison offices with the Departments of Defense and State, and the FBI. In addition, our Intelligence Division participates with all interagency intelligence committees regarding export control, including biological and chemical warfare items.

Our foreign attache offices enjoy productive working relationships with their many counterparts and other enforcement-oriented organizations in the countries in which they serve representing the United States.

Mr. Chairman, we have made significant progress in the area of export enforcement, including chemical and biological warfare items. As you and your colleagues indicated, however, there is lots to be done. It's well that we have gotten on with the job, and I assure you that the Customs Service, at all levels, will continue its efforts to stem the proliferation of these chemical precursors and biological agents from illegally leaving the United States.

Thank you.

Chairman **Glenn**. Thank you, Mr. von Raab.

Mr. LeMunyon, Department of Commerce.

TESTIMONY OF JAMES LeMUNYON, DEPUTY ASSISTANT SECRETARY FOR EXPORT ADMINISTRATION, DEPARTMENT OF COMMERCE,[1] ACCOMPANIED BY IAIN BAIRD, DIRECTOR, OFFICE OF EXPORT LICENSING, AND BEN OBERHOLTZER, DIRECTOR, OFFICE OF EXPORT ENFORCEMENT

Mr. **LeMunyon**. Thank you, Mr. Chairman.

Mr. Chairman, I'll follow your suggestion and summarize my remarks. I imagine you have some questions, and we want to leave time for those.

Chairman **Glenn**. Without objection, your entire statement will be included.

Mr. **LeMunyon**. Thank you.

Mr. Chairman, it's well known that one of the most important roles of the Commerce Department is to promote U.S. exports.

At the Bureau of Export Administration, however, our role is somewhat unique, and quite the opposite. We are in the business of controlling exports. That means that we can, for exports of certain goods and technology, to certain destinations, require that an application be filed before an item is exported. We have the authority to review that application and approve or deny it; and, when we deny it, it means the export is stopped.

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[1] See p. 393 for Mr. LeMunyon's prepared statement.

Our authority is provided in the Export Administration Act. Under this Act, we control commercial items that may also have military or weapons-related uses.

We refer to these items as "dual use" items, and I want to point out that they are distinct from the controls that the State Department imposes through its Office of Munitions Control, which focuses solely on military items.

Examples of the kinds of chemicals we control are those, for instance, used in fertilizers, petroleum-based products, paint thinners, and many others. There are some others mentioned in my prepared statement.

Our control list covers 40 different chemicals. These are the same chemicals that have been recommended for control by the Australia Group. In addition, the Australia Group, in December of last year, recommended that four additional chemicals be added to the list, and these are being reviewed, subject to the provisions and requirements of section 6 of the Export Administration Act.

In addition to chemical precursors, the United States controls several categories of biological materials. These are not yet controlled by other countries, and include toxic bacteria, viruses, as well as all genetically-engineered organisms.

The Commerce Department requires an individual validated license for each export of the controlled chemicals on the list depending upon destination outside the Australia Group, and an individual validated license for all genetically engineered biological materials to all countries except Canada. Licenses are reviewed by our staff of engineers and trade specialists, using the most current intelligence information, enforcement information, as well as information provided by the business community, and we also employ the latest electronic, office automation equipment to conduct our application review.

Proposed exports to Cuba, Vietnam, Cambodia, North Korea, Iran, Iraq, Syria, and Libya are denied. Applications for exports to other destinations are shared with the State Department, and are approved or denied, based on an end-user check.

In other words, we will review the application, see the type of chemical or biological agent, its quantity, and see if it makes sense that it be exported to the particular end-user; and, if there is some question that the particular customer would be needing or wanting that kind of product, we would examine it further and make sure that the proposed transaction is, in fact, legitimate.

In 1988, approximately 1,800 applications were received by the Commerce Department for the export of chemical precursors, covering about $68 million of export sales. We received about 600 applications for the export of biological agents covering about $600,000 in export sales.

In these two categories combined, about 2,400 applications, representing roughly 2.5 percent of all applications received by the Commerce Department for export in 1988.

The vast majority of license applications that we receive are for electronic equipment that is controlled for national security purposes.

The teeth of our control system, of course, is our enforcement effort. Violators are subject to a fine of up to 5 times the value of the export, or $1 million, whichever is greater.

In addition, a prison term of up to 10 years is also available to impose on violators.

In addition to these criminal penalties, Commerce is uniquely able to provide administrative sanctions in the form of revoking the export privileges of any person or company. We can revoke export privileges for up to 10 years and in some cases as long as 35 years.

As a practical matter, I'm told that the specter of revoking export privileges is often at least as great, if not a greater deterrent, to evading the law than the criminal sanctions.

If the control system is violated, it means that it may have also failed. If the stuff gets out, then it's gone, and we can't get it back. We can prosecute that person, and bring him to justice, but the chemical or biological agent is still gone.

Therefore, our Office of Export Enforcement and Export Licensing are engaged in a public awareness program focusing on prevention and, in particular, educating those—the manufacturers, the freight forwarders, and others—involved in the business of exporting so that they are aware of suspicious orders. We tell them where they can report information if they become suspicious.

And, as it turns out, the private sector is one of our primary sources of information regarding illegal sales. In addition to public awareness, our Office of Export Enforcement provides pre-license and post-shipment checks on certain transactions to make sure that they are, in fact, legitimate, not only checking beforehand, but making sure the goods turn up at the destination to which they were intended to go.

In summary, Mr. Chairman, I believe the authority that we have in the Export Administration Act to administer export controls is adequate. The Bureau of Export Administration reviews each application with great care, drawing on our team of engineers and specialists, and using the best information that we can get from all the agencies in the Government; and we are fully mindful of the consequences if certain chemicals get into the wrong hands.

We are also mindful of the costs that our licensing process can impose on legitimate export sales, and the ability of honest exporters to compete and win in the global marketplace.

As it was mentioned in the introductory remarks, I agree completely that the key is international cooperation. We must ensure that other nations with indigenous sources of chemical precursors and biological agents not only control the list of 40 or 44 different chemicals, but have mechanisms in their countries in which they can review licenses prior to export, check after they are exported, have jail terms and fines that really make a difference, and see that those laws are enforced.

With that, thank you for the opportunity to be here. I will be glad to answer any questions.

Chairman GLENN. Thank you very much. We'll save the questions until everyone has had their opening statement.

Mr. Harrison of the Department of State.

TESTIMONY OF ROGER HARRISON, DEPUTY ASSISTANT SECRETARY OF STATE, BUREAU OF POLITICO-MILITARY AFFAIRS, DEPARTMENT OF STATE, WASHINGTON, DC, ACCOMPANIED BY PAUL WISGERHOF, OFFICE OF INTERNATIONAL TRADE CONTROLS, BUREAU OF ECONOMIC AND BUSINESS AFFAIRS

Mr. HARRISON. Thank you, Mr. Chairman.

I request that my statement be submitted for the record.[1]

Chairman GLENN. The entire statement will be included without objection.

Mr. HARRISON. I have a few brief comments.

We are now engaged in an effort to build on the success of the Paris Conference in January. As a further step, Secretary Baker has called for an international conference of governments and the chemical industry, which Australia has agreed to host, September 18–22, 1989, in Canberra.

We hope that this conference will create and develop a continuing dialogue between governments and industries, enabling the chemical industry to contribute to the success of the CW negotiations in Geneva, in helping us better to control the burgeoning trade in CW precursors and technology.

On a separate issue, Mr. Chairman, and members of the Committee, for the moment, at least, we appear to have denied Libya the foreign assistance essential to completion of the Rabta facility.

We plan to remain vigilant and to continue diplomatic efforts to encourage others to take action which will help ensure that Libya does not succeed in achieving full-scale CW production.

In this connection, Mr. Chairman, we are gratified by the legislation introduced in the Federal Republic of Germany, which will greatly tighten laws against the export of CW precursors and technology. That legislation would make it a crime for a citizen of the Federal Republic to participate in the construction of CW facilities like the one at Rabta.

In addition, the European Community, at West German initiative, has taken up the CW issue on an urgent basis and is considering ways to coordinate export controls by all members.

In sum, while we cannot claim to have stopped the traffic in CW materials and technology, we have succeeded in enlightening responsible government and industry leaders to the problem and in enlisting their cooperation, and have made it that much more difficult for states to acquire or expand CW capabilities.

Thank you.

Chairman GLENN. Thank you, Mr. Harrison.

Mr. von Raab, you've indicated the amounts of some of these materials was 60 tons, 30 tons in other shipments, and so on. Do you have any factor as to how that converts into mustard gas, which is what they would be using it for?

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[1] See p. 401.

Mr. von Raab. I'm sorry. I don't have that, but we can certainly get it for you.

Chairman Glenn. Does anyone know what the conversion factor is?

I know it's a precursor, and it requires large amounts. I didn't know whether it is 60 tons, or 30 tons is enough to fight a mini-war with, or whether it needs a tremendous amount of thiodiglycol to make a small amount of mustard gas.

[No response.]

Chairman Glenn. Well, we can get that later, anyway.

You identified in your testimony some of the ways in which people go about this—all have phony end-users; they use intermediaries; they involve potential Mid-east potential; Mid-east destinations—all involved falsified documents.

How did Customs learn of these cases?

Mr. Kelley. In the *Sarin* case, it was by means of undercover activity. There was a source that provided us the information that that individuals attempting to locate those materials.

Mr. von Raab. We have, over the past years, developed a fair number of informants who tell us when some of this illegal activity is taking place.

In most of these cases, the informants would have been individuals that are conversant with the routine, illegal trade in all sorts of exports—munitions, it's always related to some military activity; and whether they are trying to get a TOW missile, or whether they are trying to get a chemical or biological agents—six of one, half dozen to the other—so, in effect, we have penetrated that underworld that deals with the export illegally, or attempted export illegally of munitions, and you would typically find that that was the case.

I would also point out that we actually have run some Sting operations, in which there are times that people approach us, thinking that we can provide them with this material; and, so, it's all a part of our general undercover effort.

Chairman Glenn. Were any of these illicit shipments just detected by Customs inspectors in the field?

Mr. Kelley. No.

Chairman Glenn. Intelligence work is at the heart of your operation, then, I guess. Is that correct?

Mr. Kelley. That's correct.

Mr. von Raab. Ninety-nine and $^{44}/_{100}$ths percent, and we haven't seen the other $^{56}/_{100}$ths yet.

Chairman Glenn. If these containers had been labeled "glycerin" or something else, instead of what they were, would it have been likely that they would have been detected?

Mr. von Raab. Most likely, they would have been allowed to leave the country.

Chairman Glenn. Yes, with the other material in the tanks?

Mr. von Raab. That's right.

Our inspectors basically look at the containers; they do the best they can to see if the label and the documentation accompanying it is legitimate, or appears to be legitimate. If the documentation and the labeling appears to be legitimate, and they have some expertise in seeing fraudulent labels, or fraudulent documents, then they might do something; but, if they had done a good job on that, the goods would leave the United States.

Chairman GLENN. You substituted water for the 120 tons of thiodiglycol destined for Iran. How did you do that?

Mr. KELLEY. In a 24-hour period of time, very quickly.We substituted the barrels, and ordered them back in the containers.

Chairman GLENN. How did you track that water then? How did you know where it went?

Mr. KELLEY. It was tracked by documentation, with the ships, and the assistance of Drug Enforcement Administration in our Pakistan office.

Chairman GLENN. Is Pakistan a common transit point for CBW-related commodities?

Mr. KELLEY. It was in this circumstance.

Chairman GLENN. How about the circumstance—does it have a pattern of this any more than any other nation in that part of the world?

Mr. VON RAAB. We haven't, as indicated—we haven't seen that many cases, which is the good news, of chemicals leaving the United States and being diverted around the world; so it's hard for us to sort of state that there's a pattern; and I hope it stays that way, that the amount leaving our country is not a problem, and follow the lead of the Commerce Department's representative that we show our best face so that we can show a good example for the rest of the world.

Chairman GLENN. What kind of cooperation do you get from other nations, the Pakistanis, for instance? Were their Customs authorities helpful in your investigations?

Mr. KELLEY. Yes, they were. They were helpful in that.

Chairman GLENN. How do you relate back and forth to Commerce now? You both—did you receive any assistance from Commerce or other agencies in investigating these cases?

Mr. KELLEY. Are we speaking about this particular case, Senator?

Chairman GLENN. Yes.

Mr. KELLEY. As I stated, the Drug Enforcement Administration assisted us with the tracking of this particular situation here.

Mr. VON RAAB. In the other cases, the Munitions Control case, so that's the State Department.

Chairman GLENN. But were licenses issued by Commerce then for that shipment of thiodiglycol?

For the export of Alcolac's thiodiglycol?

Mr. KELLEY. No.

Chairman GLENN. They were not issued?

Mr. KELLEY. No.

Chairman GLENN. Okay, my time is up. We are under a 5-minute rule here. I believe on the early bird, Senator Kohl is next.

Senator KOHL. Mr. von Raab, if you had the opportunity to improve the effectiveness of your Customs Service in the job that it's doing for us, what would be the 3 or 4 things that you would recommend that we try and implement on behalf of your operations?

Mr. VON RAAB. The biggest problem that the Customs Service faces basically, is its workload in foreign offices. Our typical agent working in the United States will carry caseload—it doesn't mean much to you and me, but it gives at least a sense of magnitude—of maybe 15 cases.

The agents that work in our foreign offices are carrying 50 to 60 cases. Ninety percent of those cases are export control cases; and, therefore, we are stretched rather thin abroad in terms of the number of agents that we have abroad to work these cases.

That's probably the biggest, if you would, need—not that they are not doing a good job, but just that obviously if we had more manpower to do that, we would find it useful.

Senator KOHL. What about the level of training in terms of their effectiveness?

Mr. VON RAAB. We have basically over the past 7 years developed an on-the-job training program, which now means that our 300 agents who work in the export control area and our 105 inspectors who are dedicated to this have a high level of expertise at the border or investigating the case.

We have now incorporated this training that we learned on the job into the formal training that our new agents and inspectors received.

In terms of chemical matters, it's almost hard to see what kind of training would be useful at the border, because there it's a matter of identifying the chemical as it leaves, and you get into the situation of the hazards involved in opening and testing chemicals.

Therefore, the most important training to us is the knowledge of routine, normal export transactions—what do those documents look like? Our database that we have, and the information that we receive from the Commerce Department, for example, on the licenses that have been issued. At State, as well.

Senator KOHL. So, you're talking about, in terms of improvement, increased allocation of revenue to your department to handle your operation.?

Mr. VON RAAB. Not even revenue. We could probably put those individuals abroad. It's just that the State Department has not seen fit to support our request to put additional individuals into the embassies abroad.

Senator KOHL. Okay.

Mr. Harrison, in your testimony, you praised legislation introduced in West Germany making it a crime for a German citizen to participate in the construction of CW facilities.

Do you believe that we in the United States need to enact new criminal sanctions against persons convicted of assisting in the construction of chemical or biological weapons plants?

Mr. HARRISON. Senator, I'm not sure that from the point of view of the State Department it is appropriate for me to take a position on domestic legislation like that.

Certainly we think that the more legislative penalties there are, in general terms, associated with this trade, the more able we are going to be able to be to get a handle on it.

It is a very difficult problem, as has been pointed out here. There are criminal penalties which exist. For example, for shipping illegally without licensed chemical precursors on the Munitions List. Extending that to the activity of individuals.

Sir, I can't take a position on that.

Senator KOHL. Okay.

Mr. VON RAAB. Mr. Kohl, may I just comment on that?

The penalties, as indicated, are there. The problem we have, our judges don't apply those penalties. I mean, in reviewing for this, we had five or six cases, the aggregate penalties for the five or six cases was $700. Now, that's not these cases, and maybe these will do better; but we have had some infractions involving bacterial agents, or chemicals—maybe not of the scope or magnitude as this, but in some cases, yes, there would be an administrative penalty of $100.

So, certainly, there has to be some sensitizing of the American public, as well as our judicial system to the seriousness of this, which is why these hearings are particularly useful.

Senator KOHL. Thank you.

Thank you, Mr. Chairman.

Chairman GLENN. Thank you.

Senator Lieberman?

Senator LIEBERMAN. Thank you, Mr. Chairman.

Mr. von Raab, if I can just pick up on what you just said in the case of Mr. Walaschek, I gather that you indicated that he was placed in a halfway house, or escaped from the halfway house. Is that correct?

Mr. VON RAAB. That's right, yes.

Mr. KELLEY. Yes.

Senator LIEBERMAN. Did the Government oppose that placement?

Mr. VON RAAB. Yes.

Senator LIEBERMAN. And still that was allowed by the Court?

Mr. VON RAAB. Yes.

Senator LIEBERMAN. If I may just say, it sounds to me so similar to what too often happens in other criminal proceedings, which is that somebody who doesn't look like a criminal, in the sense that the person comes in wearing a suit and has a business background, is too often too easily handled by the criminal justice system, and we end up paying for it.

Obviously, the crimes that this man was involved in could have resulted in mass murder.

Mr. VON RAAB. That's a good point.

And the interesting part about export violations, whether they be chemical, or munitions, or dual use items, is that the people that you are dealing with are businessmen; and the actions that they have taken that are criminal actions are normally business practices.

It just so happens that they are business practices applied to criminal ends, and so the jury and the judges are subject to these people—look normal, have done normal things, offering, accepting merchandise, but the point is hard to make exactly, as you put it, that what they are dealing with is poison.

Senator LIEBERMAN. Absolutely.

They may be motivated by greed but the consequence is the same as if they went into a crowd and began to fire an automatic machine gun.

We have talked some about your success in detection, and I understand the difficulty here in that whole process, and the extent—I was impressed by, and I understand the extent to which you have to rely on informants for breaking these cases.

Could you estimate what percentage of violations of our law go undetected?

And I would ask Mr. von Raab and Mr. LeMunyon.

Mr. VON RAAB. If I could have ESP, I could make a fortune answering that question in the narcotics business.

Senator LIEBERMAN. Yes.

Mr. VON RAAB. I think that given the volume that we are dealing with, in terms of getting this stuff out, I don't think that we are losing a lot of it, because we are pretty well plugged into the underworld that deals with all this.

So, I'm comfortable that the United States is not losing a considerable amount of chemical and biological agents outside. There are alternate sources, and therefore, for example in the thiodiglycol case, I think for the most part there was a competitive pricing situation to cause them to come to the United States. It wasn't that it was only available here.

So, I think that we don't have a serious problem of loss of this right now, which is why I support the concerns of this panel and the Committee that we have to crack down internationally, because we really can go somewhere else and get this right now.

Senator LIEBERMAN. Internationally, in the sense that—you think we are detecting most of the illegal shipments of these precursors from the United States, but you are concerned about movement from other countries around the world?

Mr. VON RAAB. Yes, that's right.

Senator LIEBERMAN. Do you agree with that, Mr. LeMunyon?

Mr. LEMUNYON. Let me say that I have a high degree of confidence that if an illegal export looks like it is going to go, or an application is applied for an export that is intending to circumvent our laws, I have a high degree of confidence that our Office of Export Licensing is going to find that and deny it.

The problem is the vast majority of our applications are approved because it is the good guys who are generally asking for the licenses.

Senator LIEBERMAN. Yes.

Mr. LEMUNYON. And the analogy is that a bank robber is not going to check with the local police station before he robs the bank.

Senator LIEBERMAN. Right.

Mr. LEMUNYON. The criminals are not going to check with us to apply for a license if they want to export these things illegally.

I personally do not have a good feel for how much is getting out or what percentages are. I would be glad to check with my staff, and get back to you on that later.

Senator LIEBERMAN. I'd appreciate that.

Mr. VON RAAB. I would only add one thing to this, though, that you don't have to lose much here.

Senator LIEBERMAN. Sure. Good point.

Mr. VON RAAB. This is not like our export control program, in which we are trying to limit the supply and our concern, but not that concerned over losing 1 or 2 items. Here if we were to lose this shipment, a lot of people would die, and so it's sort of an all-or-nothing operation.

Senator LIEBERMAN. Right.

Mr. VON RAAB. So, one misstep is a disaster.

Senator **Lieberman**. A strong point.

Mr. Harrison, I believe that Mr. von Raab indicated just a short while ago that his problem now is not directly a lack of personnel but in terms of foreign personnel—that is, personnel based outside the United States—but the refusal of the State Department to allow him to place more of his personnel in embassies around the world.

Am I stating that accurately?

Mr. **von Raab**. That's right, yes.

Senator **Lieberman**. Why has the State Department taken that position?

Mr. **Harrison**. Senator, I'm sorry, I'm not aware of that issue, but we can get back to you on that.

Senator **Lieberman**. Would you please submit a written response to the Committee on that question?

[The information submitted follows:]

Chiefs of Mission (COMs) have the authority under National Security Decision Directive (NSDD) 38 to determine the size, composition, and mandate of all Mission elements under their authority. Agencies wishing to initiate staffing changes should transmit their proposals to COMs in consultation with the Department of State.

The permanent placement of other agency personnel at our Missions overseas is an important matter requiring careful consideration by COM, the requesting agency, and the Department of State. COMs have been charged to relate resources to priority policy and program objectives, and must be convinced that the approval of a staffing increase would be essential to Mission's goals and workplan.

Department of State records indicate the following, with respect to requests from the U.S. Customs Service for positions at Missions overseas:

COM Manila turned down a Customs Service request for an office in March 1988 because of the "volatile local situation." The COM offered to reconsider if the situation changed.

The Department is now processing a Customs Service request to open an office in Argentina.

A Customs request to add a U.S. position in Rome has been pending the completion of administrative arrangements.

COMs have recently approved requests for additional staffing in existing offices in the Bahamas (August 1988 and April 1989) and Mexico (January 1989).

The Department of State would have no record of informal Customs Service inquiries to COMs, if the inquiries were not followed up with a formal request through official channels.

Mr. **von Raab**. There is correspondence between the Treasury Department and the State Department going back over 5 years, including letters from the Secretary of the Treasury to the Secretary of State on these issues, but we have never gotten relief.

Senator **Lieberman**. Can you state to me, then, based on that correspondence, what the rationale of the State Department is?

Mr. **von Raab**. Oh, I think it is simple. I mean the State Department has limited space, and they have a problem with, you know, doling out that space; and they are trying to cut back on their budgets.

I assume those are the reasons.

Senator **Lieberman**. So that——

Mr. **von Raab**. And security, apparently.

Senator **Lieberman**. In what sense?

Mr. **von Raab**. Well, they feel that it is necessary to protect all American personnel, and therefore that's costly.

It's an administrative problem. Please don't get the impression that they——

Senator **Lieberman**. It's not a policy disagreement.

Mr. **von Raab**. Not a policy disagreement; it's an administrative problem.

Senator **Lieberman**. It may be as simple and, to my viewing, consequential as the lack of space to house your people.

Mr. **von Raab**. It's a combination of administrative problems, administrative support, space, et cetera.

Although I will say then, on the other side, that we pay for our own space; we pay for our own support, and we are prepared to rent space; but that doesn't mean that they don't have an emotional burden to carry when additional people come on board.

Senator **Lieberman**. Well, just personally, based on what I've heard, and I understand I've only heard your side of it, I don't understand why the State Department, because of the consequences of having more of your personnel abroad, would not make every effort to accommodate them.

Mr. **von Raab**. It's not always attractive to the State Department diplomats to have more Customs personnel abroad. It does place more investigative officers abroad; it does imply in the minds of some of the ambassadors that we are not confident in the abilities of the foreign country—there are a whole series of reasons that any, you know, seasoned diplomat can come up with for not having investigative officers in that country.

Senator **Lieberman**. But, respectfully, those reasons really pale in comparison to the threat to national and world security that we are talking about here.

Mr. **Harrison**. Senator, my colleague has put our case reasonably well, but it seems to me that we should get back to you with an official answer.

Senator **Lieberman**. Thank you.

Mr. **Harrison**. I am aware that the requests of Customs and Commerce for more people overseas are not unique. Most agencies in Washington would like to have more of their personnel overseas. There is a problem with space, with security—all of those issues have to be taken into account.

Senator **Lieberman**. Thank you.

Chairman **Glenn**. Let me outline in general what the responsibilities are.

In general, Commerce, through the Bureau of Export Administration, regulates the export of commercial equipment, technology, and certain other dual use materials.

In the case of CBW, chemical precursors, like thiodiglycol, a precursor for mustard gas, State then controls exports of military equipment and technology through the Bureau of Politico-Military Affairs; and Defense through the Defense Technology Security Administration which advises both agencies of the strategic significance of the commercial and military exports. And that's a focus which that is almost exclusively oriented to East-West trade control issues.

Commerce and U.S. Customs—Customs being under the Treasury, of course—share responsibility for enforcement of CBW and most other export controls.

Mr. **von Raab**. That is not quite the accurate reason.

Chairman **Glenn**. Now, that's rather a convoluted relationship.

What?

Mr. von Raab. We share the enforcement responsibility domestically. The enforcement responsibility for activities, investigations abroad, is solely the responsibility of the Customs Service.

Chairman Glenn. Okay.

Mr. LeMunyon. If I could follow up on that, the Export Administration Act does provide our Office of Enforcement the ability to do prelicense and post-shipment checks; and that obviously does require some relationship with people overseas to make sure that proposed exports get to their proper designation.

Chairman Glenn. Well, one of the questions Senator Nunn was going to ask—and he had to go to the floor to floor-manage a bill—I'll ask on his behalf.

I understand that Commerce, Customs, and State continue to compete for jurisdiction of export enforcement duties and investigations.

How is jurisdiction for enforcement of the export laws currently divided?

You have addressed it partially. Do you want to go into it in any more detail?

Mr. von Raab. Well, let me just try.

As far as munitions control, the State Department——

Chairman Glenn. I'll ask each of you in turn to address that from your vantage point.

Mr. von Raab. I'll speak for Customs.

Customs has the sole responsibility for the enforcement of the munitions control laws. In other words, the State Department uses us as their enforcement arm, and that works fairly well.

In terms of the matters under the Export Administration Act, this was an issue that was hotly debated and discussed before PSI for some period of time, and then finally the revisions of the Export Administration Act and the appearance of Paul Freedenberg in the Commerce Department seemed to correct the issue of who was responsible for what in the Customs Service, and who was responsible for what in the Commerce Department.

Recently, that has started to fall apart, and so there are issues now, considerable contention between the Commerce Department and the Customs Service over the kinds of responsibilities that exist in the enforcement, investigative side of the Export Administration Act.

Chairman Glenn. Well, do we need legislation to clarify that?

Mr. von Raab. Well, we've had it once. I think it's there, but you may need to run us over the griddle a little bit to clarify it.

Mr. LeMunyon. I think the provisions of the Export Administration Act are adequate. I'll point out as one of the people coming on as part of the new Bush team that I've observed, and it is, of course, well known that there have been differences of opinion between agencies, particularly in enforcement of export control laws.

I think that happens because there is a great deal of esprit de corps within the troops, so to speak, of each agency. They want to do a good job, so there tends to be a natural competition.

However, if these things get into turf wars, it's my view that the only people who win are the bad guys who want to build, in this case, chemical and biological weapons, and that is not to be tolerated.

As far as some specifics on the role of the Commerce Department, perhaps Ben Oberholtzer could address some of those as our Director of Export Enforcement.

Mr. OBERHOLTZER. Mr. Chairman, I do believe that clarification is required under the Export Administration Act. There are two interpretations that lead to, not cooperation but a competition; and that's not healthy. We have attempted to work these things out; we are still attempting to do that.

But what Mr. LeMunyon said about two agencies vying for the same statistical accomplishments, it becomes very difficult without clarification to find out just what the authorities are; and I think we do need that, sir.

Chairman GLENN. Well, Mr. Harrison, you have been asked for your comments also in that area of how we are organized to deal with this?

Mr. HARRISON. Thank you, Senator.

I have asked Mr. Wisgerhof to address that issue for us.

Chairman GLENN. Okay.

Mr. WISGERHOF. Senator, the State Department takes responsibility in two areas.

We have primary licensing responsibility, via the Office of Munitions Control, for the export of items whose export is controlled under the terms of the International Traffic and Arms Regulations, and we do that with the advice of the Department of Defense, and we work in close cooperation on the enforcement of that, both with Commerce and with Customs.

With respect to dual use items, which are exported under the aegis of the Export Administration Act, we provide to the Department of Commerce a variety of consultative services. We check end-users. We provide intelligence information. We do a number of other things in assisting commerce in making determination as to whether or not a particular export is indeed reasonable and proper in the circumstances in this field.

Mr. LEMUNYON. If I could point out, and I think I mentioned earlier, that unless applications for chemical and biological materials are automatically denied for the countries that we deny to, we do share those with the State Department; and, in fact, I believe section 10 of the Export Administration Act requires all Government agencies that have any information related to export control provide that to the Commerce Department so that the quality of our license decisions can be the best they can possibly be.

Chairman GLENN. My time is up.

Senator Lieberman.

Senator LIEBERMAN. Mr. Chairman, pursuing this line of question, if I may ask Mr. LeMunyon, speaking as a former attorney general, I know that in enforcement proceedings, we often tried to balance the criminal and civil sanctions that were available for the same act.

Are you all cooperating in that? In other words, there are some cases where we felt we couldn't make a criminal case, so we had our civil authorities go forward and at least impose fines and administrative penalties.

Are Customs and Commerce sharing enforcement in that way? Mr. LeMunyon, do you want to speak?

Mr. LEMUNYON. Well, I'll point out, and perhaps Ben could provide me with some more information, but to point out that our administrative authority to deny exports for up to 10 years, and in some cases 35, tends to be, in many cases, the most powerful tool that we have, not the criminal sanctions which require grand juries, courts, and those formal proceedings. We are able, on our own, to deny export privileges. In fact, we can do it on a temporary basis for 180 days, if we believe that a violation is imminent.

Mr. BAIRD. In fact, the case at hand that you have been reviewing, the culprit in this case is Peter Walaschek, after he fled the country, we were able to immediately suspend all his privileges with U.S. exports for 10 years, and in addition put his two companies out of business. Our information in Commerce in that matter was received not from Customs but from the United States Attorney.

Senator LIEBERMAN. Yes.

Mr. OBERHOLTZER. So, what we feel in Commerce is that there should be maybe a better sharing of that information on what's going on on one side and what's going on on the other. So, we can have that mix. Now, Commerce's view is that a mix between the two—that is, criminal investigations and punishments and the administrative side—must be maintained.

Senator LIEBERMAN. Yes.

Mr. OBERHOLTZER. That's the only prevention in this area. That's what counts. So we do have that mix. But in this particular Alcolac investigation, it appeared something fell through the cracks there. We did go through and deny Walaschek after we got the information.

Senator LIEBERMAN. Correct.

Mr. Kelley, or Mr. von Raab, do you want to add to that?

Mr. VON RAAB. Only, that once a case has been taken by the U.S. Attorney, that is the place, as you well know—that's where you get the information that agency—we give our cases to a U.S. Attorney. Once the U.S. Attorney has taken them, we do not pass information outside the Office of the U.S. Attorney, because it is his or her responsibility, so it would be normal to expect that any information on cases before a grand jury, or that is being managed by U.S. Attorney would come from that U.S. Attorney and not from the investigative agency.

Senator LIEBERMAN. Let me go back to something you said earlier along the same lines of penalties, Mr. von Raab.

You talked about the woefully low penalties that have been imposed by some courts. Is that a problem only of the lack of willingness of courts to impose those penalties, or is it a failure of the law?

Do we need to increase the penalties that the law imposes on people that are found guilty under these laws?

Mr. VON RAAB. No, I think it is not the law. I think the penalties are there, whether they be administrative penalties, which are extremely useful, or several other types of civil penalties, or criminal penalties.

It's a question that—it's a problem we face in all areas. I mean, we had narcotic penalties, problems that started when the country started to develop a greater concern about narcotics. The Judiciary was slower to respond to that.

We can go into excruciating detail on the problems that we had in the early days of the Exodus Program, in which our judges weren't giving out tough penalties with respect to violations of our export administration or our munitions control laws.

I think we just face the same issue with chemical agents, biological agents, that it is just a learning process to realize through reading newspapers or reports of hearings like this, or discussions between U.S. Attorneys and judges that this is a serious and growing problem. One of the solutions to it is greater penalties.

Senator LIEBERMAN. Right.

Let me go back to something that we said before, that you said before, that you think that most of the problem in the illicit movement of the precursors for chemical and biological warfare are coming not from the United States but from other countries.

I take it that—let's take the case of the West German manufacturer that is implicated in the same of precursor chemicals to Libya for their chemical plant.

Let's assume a finding and a conviction by a government in West Germany.

Am I correct that we are powerless in the United States at this point to stop that German company from doing business in the United States?

Mr. VON RAAB. I am not the appropriate official to answer that question. I mean, I think that you can ask the Commerce Department whether they could impose an administrative——

Senator LIEBERMAN. Mr. LeMunyon?

Mr. LEMUNYON. I am not aware that we have any authority to impose import sanctions against a foreign company.

Senator LIEBERMAN. Would you support such authority?

I believe that that is part of the bill that Senator Dole has submitted.

Mr. LEMUNYON. I would defer to my colleague from the State Department, who I know has looked at the bill. But I would raise two issues:

First, we need to understand that foreign governments could also impose similar laws against our companies if they think U.S. firms have violated, regardless of whether Customs or Commerce, or anyone else, says there has been a violation.

And, secondly, we need to understand the impact that those kinds of controls may have on cooperative efforts of the Australia Group, which I think has done much, but which can do much, much more.

Senator LIEBERMAN. Mr. Harrison?

Mr. HARRISON. Senator, the Administration is willing to consider legislation which would impose sanctions on companies that aid in the proliferation of chemical weapons. I believe this is going to be the subject of hearings on Thursday. We are obviously eager that those sanctions should be exercised with Presidential discretion, in his role as leader of foreign policy.

But we are willing to look at appropriate sanctions.

Senator LIEBERMAN. I appreciate that answer because I do think that is an important part of Senator Dole's bill.

Thank you, Mr. Chairman.

Chairman GLENN. Before I call on Senator Heinz, just for the record, were your statements required to be submitted to OMB for clearance?

Mr. LEMUNYON. Yes.

Mr. HARRISON. Yes.

Chairman GLENN. All of you?

Mr. VON RAAB. Yes. They had a good shot at mine.

Chairman GLENN. You what?

Mr. VON RAAB. I said they had a good shot at mine.

Chairman GLENN. Were any of your views required to be changed in your statements?

Mr. VON RAAB. Not substantially.

Chairman GLENN. Now, the question was, were there any changes required?

Mr. VON RAAB. There was a peculiar change in mine, in which I referred to the fact that Customs Service has been enforcing the laws for 200 years. They took that out, so I'm not sure why that happened, but that's the nature. [Laughter.]

Senator LEVIN. He has violated Gramm Rudman Amendment— [Laughter.]

Chairman GLENN. Well, just so all the Committee is aware, and you are aware also, that witnesses here are required to give their own opinion, if asked, quite apart from OMB. That's our agreement with them, whether it's defense or whether it is your testimony or whatever. So, if we want to get into what was changed, why you are duty-bound to give it to us here.

So, Senator Heinz.

Senator HEINZ. Are you suggesting we review 200 years of law enforcement history? [Laughter.]

That is oversight.

The next panel includes Paul Freedenberg, who is now a free man. Having had a checkered career before that, he has been in both the executive branch and the Congress. Indeed, I was privileged to have him as my staff director here on international finance for many years, where he taught me a lot about the Export Administration Act.

I gather he is going to testify that the law needs to be strengthened. And, as you know, Senator Dole and myself, and others have proposed some very specific strengthening of the law.

Is there any disagreement on this panel that the law indeed does not need to be strengthened? Do you all agree that it does need to be strengthened?

Speak now, or forever hold your peace.

Mr. LEMUNYON. I think it is a matter of how you want to strengthen it, and what is trying to be achieved. I'm aware, Senator Heinz, that you have been one of the primary authors of many amendments to the Export Administration Act over the years, and I'm satisfied personally that the authority in that Act is satisfactory for us to carry out our licensing obligations.

Senator HEINZ. There are, I'm told, no controls on the export of much of the equipment, technology and expertise needed to make chemicals for poison gas—that is, to make the precursors.

Is that true?

You have no authority to——

Mr. LEMUNYON. We have authority to control them.

Senator HEINZ. But no control?

Mr. LEMUNYON. But they may not now be controlled. I would have to examine specifically what we control and what we don't to make sure I respond accurately; but, certainly, we are obligated under section 6 of the Act to examine issues such as whether we will be controlling unilaterally or whether there are cooperative efforts overseas to make sure that the controls have their intended effect or not—and we attempt to limit the unilateral nature that controls may have.

Senator HEINZ. Now, this issue is, of course, not a new issue. Our Government has been pursuing it very stringently with the Germans with respect to Libya.

If the Germans were to come to us and say, "Well, President Bush, you have no controls on the kinds of exports that you quite properly, with the benefit of hindsight, complained about to us from Germany to Libya," what would we tell them?

Mr. LEMUNYON. I would first want to look and make sure I know what we have controlled and what we don't have controlled.

Senator HEINZ. Well, the purpose of this hearing is to look.

Mr. LEMUNYON. Okay, well, then, we'll do that.

And, secondly, I would think——

Senator HEINZ. You mean to say, you don't know whether we have got controls on these kinds of things? You are here at this hearing, and you don't know?

Mr. LEMUNYON. I want to be sure that we are talking about dual use items or whether we are talking about items that have a military purpose, and may be controlled by OMC, and I don't have them in mind——

Senator HEINZ. Well, how about just an old terrorist purpose as opposed to a military purpose?

Mr. LEMUNYON. Well, again, the distinctions are often quite technical. "Terrorist" could be considered "military," but not in some cases.

If an item has only an explosive purpose, if it blows up, it is generally military only. If it has both commercial and military applications, it's not on the OMC list.

Senator HEINZ. Well, let's take precursors. Okay?

Mr. LEMUNYON. Okay.

Senator HEINZ. My information—maybe it's not correct--but my information is that on most precursors, we simply don't have any controls in place.

Is that correct or incorrect?

Mr. LEMUNYON. We have controls on 40 different chemical precursors, and they are the same 40 precursors that have been recommended for control by the Australia Group.

Senator HEINZ. Okay.

Mr. LEMUNYON. In addition, we have controls——

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Senator Heinz. But what do we not have controls on that we should have controls on, as a layman?

Mr. LeMunyon. At this point, I am not aware that we should have any other control, but those items are under review.

Senator Heinz. Do you want to tell us what's under review?

Mr. LeMunyon. I am going to go back and check, and we will respond in writing.

Senator Heinz. All right, that would be helpful.

Mr. LeMunyon. Yes.

Senator Heinz. Thank you.

Let me just ask Bill von Raab in the little bit of time left, I understand, Bill, there was some discussion of your training program for your agents who have to recognize shipments on their way out, that you have an on-the-job training program.

Is that right?

Mr. von Raab. Well, I said we effectively had one over the past 6 years. It now has been formalized, and we give that training to new recruits, and to people that are being put into that responsibility.

Senator Heinz. What is the nature of the training they get in order to recognize what is and is not a critical chemical?

Mr. von Raab. You are talking now of an inspector, a man or woman on the border?

Senator Heinz. Yes.

Mr. von Raab. Why don't I just save time and get a more accurate answer—Mr. McGowan is responsible for, among other things, this training. If he could just give you a quick answer.

Mr. McGowan. We have at Glynco, where we start our basic inspectors—we have a class that we have added to all basic inspectors, so all 5,000 inspectors in the field have some knowledge of what is controlled for CP uses.

We have 104 inspectors dedicated to the Exodus effort, and they have participated in our Gemini outreach program with the Office of Investigations. We have established seminars; we attend trade shows. We meet with the industry, the local ports of export; and we train each other.

The 104 positions, we rotate those inspectors on and off. We do that a little bit slower than we do on normal rotations, because we recognize there is expertise there.

Mr. von Raab. Well, John, as a practical matter, aren't our inspectors who stay there looking at barrels with paper labels on them?

Mr. McGowan. Correct, sir. Yes.

Mr. von Raab. So, training is——

Senator Heinz. You have to go by what's on the barrel.

Let me ask this: do they—are they trained to verify the paper with what's in the barrel?

Mr. McGowan. Yes.

Senator Heinz. Is there any way for them to do that?

Mr. von Raab. Our inspectors typically receive a package of documents, which they would check to see whether they were in order; and by "in order," I don't mean against, some just rote checklist. I mean, they know what is a responsible, properly prepared set of export documents.

Typically, they would tee off of something irregular in the package of documents.

If they are suspicious, then they would call our command center who has, among other things, a list of likely offenders and we might detain it, and obviously would check with the Commerce Department or the State Department, depending on whose jurisdiction it fell in.

But if the documents, package of documents was in order, and it stated it was not licensable and the labels and everything else were in order, we would allow that shipment to go.

Senator HEINZ. Yes.

And there would be no practical way you could know that if that was being shipped to what appeared to be an appropriate destination, that were the recipients at that destination to transship it, that there would be no way you could know that?

Mr. VON RAAB. Unless we had previous information.

Senator HEINZ. Unless you knew it was an unreliable end-user? Is that right?

Mr. VON RAAB. Right, and I think we had—just to give you an idea—there was a case in 1984, in which there was an alert sent out. We do send out alerts, and in that case, where we are alert as a result; and there was a possibility of a large shipment of potassium fluoride to Iraq without a license.

We had good enough information developed by our agents that inspectors were able to see there was a large shipment of chemicals, and the characteristics of it were sufficiently similar to the alert that was sent out. Then we stopped it.

But short of irregular documents, an anomaly in the shipping techniques, or information, you are absolutely right, it would just leave the country.

Senator HEINZ. One last question, if I may, Mr. Chairman.

Chairman GLENN. Yes.

Senator HEINZ. A quick one.

Mr. Harrison, I made suggestions about upgrading the Australia Group. What is the State Department official position with respect to what we should be trying to get the Australia Group to do?

Mr. HARRISON. Well, if I remember, Senator, one thing that you suggested was that the headquarters be moved to Paris?

Senator HEINZ. I suggested three things.

Mr. HARRISON. That's right.

Senator HEINZ. One, that we move to Paris; two, that they actually—that they have something other than the consensus method of making decisions; and, three, that their decisions when made be binding and mean something.

Mr. HARRISON. That's right.

Well, at the moment, they do meet in Paris, Senator. They don't have a headquarters because at the moment there is no established secretariat for the group.

Senator HEINZ. Well, my other suggestion was that they have a permanent secretariat.

Mr. HARRISON. And that issue is now being discussed. It will be discussed at the upcoming meeting of the Australia Group. There are several members who have suggested that this be institutionalized and formalized.

Senator HEINZ. What's our position?

Mr. HARRISON. Our position is that we want to see what the arrangements are. We have, to a degree, a little secretariat phobia because of the expansion of the international secretariats, but we think it might be appropriate in this case. We want to see the specific recommendations.

Senator HEINZ. But we don't have a position?

Mr. HARRISON. It is going to be made. I think we are positively inclined but not yet ready to sign up until we see what's being——

Senator HEINZ. We are not urging them to establish a permanent secretariat?

Mr. HARRISON. We are not in the forefront of that effort, no, sir.

Senator HEINZ. Okay.

Mr. HARRISON. Secondly, in terms of the binding agreements, in the Australia Group, that is, I think, one approach. I think our view would be that the Australia Group works as it does because it's a voluntary association of sovereign nations, and that if you tried to impose a mandatory regime on the Australia Group, we would find the cooperation we are now getting breaking down.

We have a very useful forum. We are beginning to get more information to flow between the countries involved. I think a key ingredient of that is that each is participating voluntarily because of the concern each shares about proliferation of chemical weapons.

So, I think there is a danger here of overstressing that. And move for voting from unanimity again. It's, I think, true in the Australia Group that so far——

Senator HEINZ. Well, you have been through that with the answer you just gave, I think.

Mr. HARRISON. Just to add that at the moment we have achieved consensus on almost every issue, and we would hope that that consensus-building, rather than a formal voting procedure, would continue.

Senator HEINZ. Mr. Chairman, thank you very much.

Chairman GLENN. Thank you.

Following up on Senator Nunn's question a while ago also, in 1984, the Subcommittee found that bureaucratic disputes between Customs and Commerce were impeding effective enforcement of export controls on high technology items.

Is that still the case, Mr. von Raab?

Mr. VON RAAB. Well, as I indicated, when Mr. Freedenberg took over, and as a result of a number of hearings and agreements that were established, that situation was cleared up and did not have—we didn't have problems.

However, starting, I would say, about 7 or 8 months ago—it's nothing to do with the incoming Bush Administration, that was subsequent to that—the situation started to fall apart again.

So, I think it has to be revisited and looked at.

Mr. LEMUNYON. If I could follow up—at BXA, the working, cooperative efforts with Customs, not only in the case of enforcement, but in all areas—we will be reviewing that and ensuring that it is as good as it can be. This is one of our primary objectives.

And, again, just to reiterate, that interagency turf battles that are waged at the expense of the effectiveness of our export control and enforcement are not to be tolerated and nobody wins in those cases.

Chairman GLENN. What happened 7 or 8 months ago then is that started down the wrong track?

Mr. LEMUNYON. I'm not aware of what happened.

Mr. VON RAAB. There is a whole pile of correspondence on this matter that I'm sure the Committee can get its hands on, if they want.

The issue simply is whether the Commerce Department should re-enter the area of foreign investigations which we thought had been resolved—I'm not talking pre-shipment or post-license checks, I'm talking about criminal investigations abroad. That's the rub. That was the rub in 1984, and it's the rub again.

Chairman GLENN. Well, in 1984, the Subcommittee also recommended Customs be the sole enforcement agency. Now, we didn't pass legislation to do that at that time. Do you think Customs should be the agency with sole statutory authority for criminal and civil investigations of violation of the Export Administration Act and Arms Export Control Act, instead of Commerce having that jurisdiction?

Mr. VON RAAB. There are arguments that can be made for that. I would stand by the agreements that were made in 1984, in which there was basically a joint jurisdiction domestically, because there are reasons for both of us to be involved, but Commerce was working domestically, and to leave the export—I mean, the foreign investigations with the Customs Service. I don't see any reason to go back and try to go back on an agreement that I think worked for 3 or 4 years.

Chairman GLENN. Well, do we need legislation to somehow enforce that cooperative agreement?

Mr. VON RAAB. I don't think so. I think the agencies should be brought up and asked to resolve this between themselves.

Mr. LEMUNYON. I would agree with that.

Chairman GLENN. You have some 40 precursors. You mentioned, Mr. LeMunyon, that you say are controlled. Are they controlled to all destinations?

Mr. LEMUNYON. We require a validated license for the export of those items to all destinations outside the Australia Group of countries. For the remained, we require licenses to certain countries of concern as described in my opening remarks.

Then in the case of biological agents because they are unilaterally controlled, we require an export license to all destinations other than Canada. We deny applications to Iran, Iraq, Syria, Libya, Cuba, Vietnam, Cambodia, and North Vietnam.

Chairman GLENN. The Commerce Department's 1989 Foreign Policy Report to Congress stated that the U.S. uses demarches, private bilateral diplomatic communications, as a means of preventing the foreign export of illicit CW-related commodities.

According to press accounts, there have been over 100 such demarches involving CBW-related issues over the last few years.

What's the State Department's evaluation of the effectiveness of this demarche process? And how many are sent out each year? And then what happens to them?

Mr. HARRISON. Senator, our analysis is that the effectiveness of this process has been growing, and I think the reason for that is the growing international attention to this problem, which has been focused on at the Paris Conference, and in the Imhausen incident. We are beginning to see some very positive results from our demarches. I wouldn't claim that all of these are successful; but we certainly have had some notable successes in recent months.

In terms of the number, I would have to get back to you on the number. My impression is it's in the teens so far this year, but I would have to get the exact number back to you.

[The information submitted follows:]

We have not tallied all our diplomatic communications regarding chemical and biological weapons proliferation during the past several years. These approaches take many forms: official demarches regarding detailed information we have received and specific action we expect to be taken; general approaches covering our concerns and trends that we observe; informational papers educating countries to our non-proliferation policies; notification of actions the U.S. has taken and a wide variety of other issues.

We discuss these issues on a continuing basis with suppliers and consumers alike and with close allies and others who do not necessarily share our views. We attempt as much as possible to coordinate our policies and approaches with like-minded states within the Australia Group, and consult with these countries when we obtain information indicating their firms are involved in supplying material or technology to programs of concern. They, in turn, reciprocate by alerting us to similar evidence of U.S. involvement. We also engage in discussions with the Soviet Union, a number of Asian countries, and potential suppliers in Latin America and Eastern Europe. We discuss our concerns directly and regularly with Middle Eastern states, with whom we have made clear our position on chemical and biological weapons non-proliferation.

Chairman GLENN. Well, do people really react to these things, though, because my confidence in the demarche process at the State Department has not been very high in other areas. We send demarches all the time, and I think their way of saying "Well, we've done something." But really, there is quite often very little, if any, response.

Is this a creation of more awareness through demarches, or do people—have there been any instances at all that you can cite where people really acted on a demarche that we sent to them?

Mr. HARRISON. Yes, sir, not in open session. But there have been such instances, I think. As I said before, that we've seen growing effectiveness from this, and one reason is that often this activity is conducted in secret.

Our demarches let countries know that we are aware of activity, and that can often affect their behavior, in terms, especially, of sales of dual use items, and CW precursors.

Chairman GLENN. My time is up.

Senator Lieberman.

Senator LIEBERMAN. I have no further questions, Mr. Chairman. Thank you.

Chairman GLENN. We could go on all day here, obviously. I have another 15 or 20 questions for each one of you here, but we are going to have to submit some of those, and hope you could respond in writing to them so that they would be part of the record, if you would please.

We are going to have to move on to our second panel.

Gentlemen, obviously, we need to do more coordinating in this area. I don't think there is any doubt about that. I don't know whether you can get your own houses in order over there as far as cooperative effort goes, or whether we are going to have to do something here, but one way or another it has to be because we are much concerned about the whole CBW situation around the world, and we want to do what we can to make sure that we try and control it as much as possible.

So, I will be back to you with some other suggestions and questions, and then we'll decide whether we need to do anything more from this end of the avenue.

Let me ask one additional question:

Mr. von Raab, you mentioned that the historical reference to the Customs Service was the only thing changed. Did you say that was the only thing changed in your testimony?

Mr. VON RAAB. I would say that is the type of change that was made, nothing substantive was changed.

Chairman GLENN. Nothing substantive.

Mr. Harrison, was anything changed in your testimony?

Mr. HARRISON. No change in my testimony, Mr. Chairman.

Chairman GLENN. Mr. LeMunyon.

Mr. LEMUNYON. A couple of syntax errors, but other than that I think I escaped unscathed.

Chairman GLENN. All right, fine. Well, I just want everybody to understand that when they are submitting statements for OMB for approval, that's OMB's right to do that; but we also have a right to ask to ask what your original impression, your original statement was, and that's something that is supposed to be given to us also. So, I just wanted to check on that.

Thank you, gentlemen.

Our next panel is Mr. Paul Freedenberg, Trade Consultant, Baker & Botts, of Washington;

Mr. Richard Perle, resident scholar at the American Enterprise Institute;

Mr. Max Turnipseed, Chemical Manufacturers Association.

Mr. Freedenberg, if you would lead off, please, we'd appreciate it. Your entire statement will be included in the record. If you care to give a summarized version, we would welcome that so that we have as much time for discussion as possible.

In either event, the entire statement will be included in the record.

TESTIMONY OF PAUL FREEDENBERG, TRADE CONSULTANT, BAKER & BOTTS, WASHINGTON, DC

Mr. FREEDENBERG. Since I have just been out of the Government for 24 hours, I don't have my written statement for submission now. I will have it for the Committee at a later time.

Chairman GLENN. All right, fine.

Mr. FREEDENBERG. I will summarize my remarks.

Our current controls are focused on both the commodity involved in the export and the end user.

As my colleagues have explained, chemical commodities have a number of legitimate commercial uses, and are difficult, if not impossible, to distinguish from commodities for weapons development.

A logical conclusion is that we need to focus on the end user. This means that there would be heavy dependence on intelligence sources, both domestic and foreign.

However, knowledge and expertise of the technical capabilities of the commodities, and the nature of the end user, are only applicable when a license is required.

Most of the production equipment and technical data that could be used in chemical weapons development is available from a number of foreign sources, and can be shipped from the U.S. under a general license with no Government review required.

That was a question that Senator Heinz asked, which is, Do we have controls on these products?

Essentially the technology to make chemical weapons, particularly the final end product is generally not controlled by the Australia Group, and the technical data, much of which is generally available in public technical literature is not controlled worldwide, except to the 4 countries that we have particular problems with—that's Iran, Iraq, Syria, Libya.

So that's where we have one of the gaps in our legislation. However, the other side of it is, this is very low-level technology, and one could imagine that an industrious nation looking through the available technical data from public sources could get this sort of information from those sources.

As I see it, we have three choices:

We could change our controls to require individual review for all goods that could potentially be used in weapons development, which is not a viable option given the volume of international business done by the chemical industry and the enormous amount of foreign availability.

I think in the written testimony of the Commerce Department, it's noted as $238 billion worth of products shipped each year from the American chemical industry alone, and the amount of exports are 10's of billions, and it's our most productive sector of the economy in terms of exports. We have a $12 billion trade surplus in our chemical industry.

Second choice would be to communicate to exporters the names of end users that we suspect of chemical weapons development; and, while this approach makes sense, we ran into a number of legal and political difficulties in trying to do the same thing for nuclear end users. That is, when you try to create a black list, or a gray list, you can have some real difficulties in terms of the uncertainty that you might have if the particular end user has no criminal background and no criminal record.

The third option would be to target our controls on chokepoints, or on the most sensitive goods and press for multilateral cooperation in controlling international trade in these goods. That, I think, is our best option.

The Australia Group, about which you have also heard from my colleagues, has determined that 40 chemicals are sensitive for the development of chemical weapons. The Group recommends that all participants control nine chemicals on the core list.

I believe recently that was raised to 17 chemicals on a core list.

And the rest of the chemicals on the list are on what is called a "watch list."

Because of the seriousness with which we monitor these chemicals, the U.S. currently maintains much stricter controls on these chemicals than the rest of the Australia Group. Of course, we also have the most stringent licensing system, so that's understandable.

Many have suggested that the Australia Group be strengthened to more closely resemble COCOM, and that was a suggestion that Senator Heinz had.

While I agree that the Australia Group is important, and should be strengthened, it is also important to remember that the basic premise for export for COCOM export controls does not exist with regard to chemicals. That is, COCOM is based on the fact that we and our allies have a technological advantage over our potential military adversaries in the Warsaw Pact. We maintain export controls to retain that advantage.

We can identify goods with potential military uses, and we have clearly defined the parameters for good and bad end users.

In the case of nuclear controls, the signatories to the Nuclear Nonproliferation Treaty are public knowledge, and again the goods and technology involved can be readily identified. Also, nuclear technology is not available worldwide and is very sophisticated.

On the other hand, chemicals and chemical weapons production equipment and technology are quite different. The various countries involved in their production have different concepts of unreliable and bad end users. There is no clearly defined target group for the denial of this capability, and also the chemicals and the chemical equipment and technology are available worldwide and do not represent particularly sophisticated capabilities.

We therefore can neither expect nor insist that the prevention of chemical and biological weapons development be handled solely through export controls. Such controls are simply not a viable mechanism for many of these products because there's not an international agreement on their need or on their scope.

Moreover, it is highly likely that the developing countries, with the capability to produce chemical weapons will resent another "big boy's" club approach, like COCOM, particularly in the absence of some sort of commitment on the part of the superpowers to eliminate or at the very least reduce their stockpiles of chemical and biological weapons.

As you have heard, the Australian Government is planning a government-industry conference in September of this year to discuss the problem on a worldwide level.

The idea for this conference came from the United States, and I think it's the best hope we have for beginning to effectively control the means to produce chemical weapons.

Perhaps the most important goal of this type of multilateral conference and cooperation would be better enforcement coordination. We could also get better intelligence coordination and heighten industry and public awareness of the problem.

But it should also be noted that without public and industry support for the prevention of chemical and biological weapons proliferation, without a plan for accomplishing this objective that takes into account the legitimate commercial consideration, we will never accomplish this objective.

The outreach program that has been mentioned by the Customs Service and by the Commerce Department's Export Enforcement, to inform U.S. industry of the goals of chemical and biological export controls and the importance of industry input in accomplishing these goals is indispensable.

We also need this type of education program for foreign producers sponsored by their own governments.

A final point needs to be emphasized: I believe that multilateral cooperation would be seriously undercut by unilateral and extraterritorial U.S. sanctions. This would be particularly unfortunate because the need for worldwide attention to this issue is too important to allow it to be damaged by unilateral punishment by the United States Government for sales that are completely legal under the laws of the home country.

I believe the only way to deal effectively with this growing problem is through a multilateral agreement and through stringent enforcement at the national level worldwide.

Thank you, Mr. Chairman.

Chairman GLENN. Thank you.

Mr. Perle.

TESTIMONY OF RICHARD PERLE, RESIDENT SCHOLAR, AMERICAN ENTERPRISE INSTITUTE

Mr. PERLE. First, the problem of controlling the export of commodities and technology that would enable countries to develop and produce chemical weapons, or nuclear weapons, is similar to the problem of controlling dual-use exports through the COCOM process.

I would agree with Paul Freedenberg that controlling the export of chemicals from the United States would be a massive undertaking and probably not a very productive way to deal with this problem.

It would be better, in my view, to put the emphasis on controlling the export of plant and equipment. There aren't that many plants; the equipment is fairly specific. These are sizable projects which involve engineering. They involve people visiting sites, and I think we could do better by attempting—together with our allies—to control the construction of plant and equipment in countries that we know are interested in producing chemical, biological, or for that matter, nuclear weapons.

Secondly, I agree with the consensus that we can't accomplish much unilaterally, that we can only be effective if an international effort is mounted. There are some promising developments along these lines, as indicated earlier with the Australia Group. But I think the critical issue is going to come down to improved enforcement of an internationally agreed upon set.

In discussing the current system of control, there are virtually no controls on exports to the Australia Group. As a result of action taken by the Congress, which I think in the last revision of the Export Administration Act was profoundly mistaken, we are in the process of dismantling controls on exports to COCOM member countries. This, even though we know diversions take place, principally through exports to COCOM member countries, and significantly to members of the Australia Group, occurs through an elaborate process. If you look at cases A-1, A-2, and the third case,[1] you will find in each that the export of sensitive chemicals entailed an export to a country for which a license is not required because we have excluded them.

Now, it's absurd to insist on licenses for the export of chemicals to Libya, because Libya is not about to go through the process of requesting an approved license for the importation of chemicals given the attitude of the U.S. Government toward Libya, if we allow all of the diversion channels to remain open.

We need to face up to the implications of relaxing the controls on exports to countries that themselves are incapable of monitoring their own illegal commerce.

Finally, let me conclude with a suggestion. I've spent about 20 years monitoring the system of export controls, and have come to the conclusion that no matter how hard we try, no matter how successful we may eventually be in resolving disputes among U.S. Government institutions or increasing the resources available to those institutions to do the job, we will only make significant improvements in the overall scheme if we do something long overdue—and that is to the extent possible privatize the process by which the U.S. Government attempts to exercise and enforce controls.

And, simply put, I would propose this scheme along the following lines: We know that most of what moves illegally, whether it is dual-use high technology for military purposes or for the production of chemical or nuclear weapons, is transferred internationally through diversions. The principal mechanism by which diversions are accomplished is through an initial transaction made with a company in the country where the sale and exchange of commodities of this type is permitted.

False representations are made, obviously, when licenses are applied for, and the ability of the Government to monitor this effectively is limited. In part, because it is limited, we are slow and sometimes capricious. It is a burden for industry, which industry understandably has sought for a long time to mitigate.

Suppose we were to establish a list of private companies approved by the appropriate Government agencies, and when an application is filed for a license to export a controlled item the various statements in that license could be certified by a private organization. As long as it did so honestly and effectively, the private organizations' certifications would be accepted by the appropriate licensing authorities. They would have a powerful incentive to do that job competently.

Industry, in turn, could solve much of the problem about which it now complains—that is, delays and capriciousness in the licensing process—by going to private companies who would do the necessary work and provide the necessary certifications. By removing Government from this process, we would greatly facilitate the cooperation of Governments abroad who would view this quite differently than private investigation undertaken on behalf of the companies involved in the transaction as opposed to what often appears to be the extraterritorial involvement of Government institutions from abroad.

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[1] See charts on pp. 519-522.

I was struck listening to Senator Heinz, who asked earlier: "How do we verify that the substances are what they are supposed to be?"

The answer is, that we don't do that now, but there are private companies explicitly organized to do that, and there is no reason why they shouldn't.

Senator Heniz also asked, "And how do we know what we need to know about the destination of the end user?"

By and large, we don't at present. But we certainly could if the appropriate investigations were made and certified by approved companies.

Now, I've been talking to some private companies capable of this kind of work, and there is real enthusiasm for this sort of activity. It would give you a fair shot at effective implementation of controls that Government is simply never going to implement effectively.

Chairman **Glenn**. Thank you.

Before we get to Mr. Turnipseed, that five buzzes you just heard mean that we have a very short time to get to the floor and vote, and so we will have to have a short recess here while we run over an vote, and we will be back as fast as we can.

Thank you.

[Recess.]

Chairman **Glenn**. The hearing will resume.

I apologize for the delay. It is beyond our control, obviously. When we got over there, it turned out there were back-to-back votes, so it took a little longer than we thought; we had to wait for the second vote.

Mr. Turnipseed, we are ready for your testimony.

TESTIMONY OF MAX TURNIPSEED, CHEMICAL MANUFACTURERS ASSOCIATION, WASHINGTON, DC, ACCOMPANIED BY PETER D. TROOBOFF, OF COUNSEL, COVINGTON & BURLING

Mr. **Turnipseed**. Thank you, Mr. Chairman.

The Chemical Manufacturers Association appreciates the opportunity to appear before this Joint Committee and look forward to trying to respond to some of the questions that you raised in our invitation to be here.

Accompanying me this morning is Mr. Peter Trooboff, from Covington & Burling. He has assisted the CMA in this matter and export control counsel for some time.

Today we are going to concentrate on the chemical weapons aspects of your hearings, and questions relating to those chemicals that you raised.

Our complete statement, of course, has been submitted for the record,[1] and I will just try to quickly summarize some of the key elements of our statement.

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[1] See p. 421.

CMA and its members strongly support a multilateral treaty to ban chemical weapons and the relevant U.S. export controls that are currently in place to store chemical weapons and precursors for making chemical weapons.

However, CMA urges that the United States avoid unilateral export controls that place American companies at a disadvantage in competing for legitimate commercial sales with European, Japanese, and other manufacturers of similar chemicals that do not face the same burdens.

Effective and fair export controls will result only from a multilateral regime negotiated with our major trading partners. Unilateral programs will cause adverse economic impact on the domestic industry and will not achieve the objectives unless our allies have similar regimes in place.

CMA strongly supports the multilateral negotiations of the treaty banning the production of and possession of chemical weapons. CMA has worked for over 10 years with the U.S. Government on such a treaty and its related issues. Through its working group, we have met with United States Government officials from all the agencies involved in negotiating that chemical weapons treaty, including the Arms Control and Disarmament Agency, the Departments of Defense, State, and Energy, and the Joint Chiefs of Staff, and the intelligence community.

CMA has cooperated in this activity also with the international trade associations around the world, including the European Federation of Chemical Manufacturing Associations that represent 17 national trade associations; the Japanese Chemical Industry Association; the Canadian Chemical Producers; and the Australian Chemical Industry Council.

Turning now to the U.S. Government's enhancement of controls on products capable of use in manufacturing chemical weapons, for many years, the State Department's Office of Munitions Controls has imposed export controls on those chemical agents which are included on the Munitions List and International Traffic in Arms Regulations.

I might pause there to say from previous questions this morning, it's our understanding from the Regulations that clearly all products and technology that are listed in those Regulations are, in fact, controlled. So there is control over both products and technology, as far as the ITAR regulations are concerned

As far as we know, they are not presenting any major problems; they are fairly comprehensive, and we consider them to be effective. There is, as noted earlier, some confusion, however, from time to time, on who has jurisdiction here between the State Department and the Department of Commerce, so clarifications in this area would be helpful.

Turning to the Commerce Department, over the past several years, they have been moving toward harmonizing U.S. controls with other countries, particularly the NATO countries and other Western countries that maintain comparable licensing regimes.

The most recent action in February of 1989, acting under the Export Administration Act, altered the basis for controls on 23 chemicals from national security to foreign policy reasons.

The only additions to the controls that occurred in February related to the exports of certain chemicals to Iran, Syria, Iraq, and Libya. Again, the purpose was to limit the chemical weapons manufacturing to the proscribed destinations and to harmonize our controls with those of Western countries that are concerned about the proliferation of these chemicals.

CMA believes that both the ITAR and the Export Administration regulations for controlling chemical weapons and precursors do constitute a comprehensive and reasonably well-designed U.S. regime which, assuming compliance, should help prevent the spread of chemical weapons and weapon manufacturing capabilities.

However, no regime is likely to catch the bad actor, particularly unless there are unilateral controls of the same nature applied around the world.

A more extensive U.S. regime now would contribute to the prevention of chemical weapons proliferation only if all other countries with military significant chemical weapons manufacturing capabilities participate in these new restrictions.

Unilateral action is particularly inappropriate in the case of chemicals because many of the products and related technology have well-established, legitimate uses in non-sensitive commercial markets.

Experience with export controls on products show that trade restrictions on such dual-use materials are effective only if in a well-defined agreement on the policies that the governments of all potential suppliers will follow in carrying out the export limitations.

We believe that more can be achieved through multilateral cooperation than through unilateral controls or threats of sanctions. Only if the world's principal trading partners support a common objective can controls of chemical weapons be achieved.

CMA urges that Congress concentrate on pressing the Administration to move forward with agreements that our allies are prepared to support. The Commerce and State Departments should seek to obtain unified allied action before any additional controls are imposed on the export of technical data relating to the production of chemical weapon precursors.

If the technical data is readily available in international markets today, little will be achieved by having unilateral U.S. restrictions in place.

CMA does not support any unilateral expansion of U.S. export controls over technical data relating to precursors of chemicals or other chemicals.

Expended controls on technical data should only be imposed if our allies will join in such restrictions. Such controls should be limited only to what is necessary to prevent the chemical weapons manufacture.

The existing controls could be improved by standardizing nomenclature, clarifying the applicability of controls, and expanding the use of the electronic filing systems.

CMA members are also concerned that the new controls on chemical production equipment could slow acquisition of such equipment in this country. Much of the equipment required in the manufacture of chemical weapons is relatively unsophisticated.

In fact, it is probably impossible to identify equipment which is specifically designed or modified to be capable of producing chemical weapons. Most of it is multipurpose equipment that is designed and can produce a variety of chemicals.

The U.S. export control program for technical data and equipment will only work if our potential supplier nations are prepared to join in the same control regime.

Turning now to our actions at CMA, our members for many years have maintained internal administrative systems to implement export control obligations by classifying their products, by determining levels of control, and applying for validated licensing.

In the light of the recent U.S. Government emphasis on chemical exports and the increased controls to certain countries, members have voluntarily taken action to enhance the effectiveness of the U.S. Government programs designed to prevent the spread of chemical weapons.

Some of the actions that CMA are currently involved in is a newly-organized industry educational program for our members putting strong emphasis on an awareness program and helping our members to be able to understand and apply the export control regulations.

We are encouraging increased vigilance against attempted improper export transactions, particularly by looking to our member companies to stress to their personnel the need for this increased vigilance.

CMA is serving as a clearing house in trying to supply export control information to our member companies when questions arise. We are continuing to assist the U.S. Government in identifying potential diversion situations, and, finally, we are working internationally with other trade associations and with the Government in this area of education in trying to prevent diversion.

Some of that action, or some of those initiatives, of course, have been mentioned here earlier today, and the conference that takes place down in Australia in September, CMA plans to be present there, not only with representatives of CMA but also three or four of our member companies will have representation there.

And so we are doing, we think, everything we can to cooperate and to offer assistance where we can.

CMA supports the treaty to ban chemical weapons. We are trying to cooperate fully to achieve the objectives of the treaty. We want to work and completely get a workable agreement on the treaty. It's not finished, but it has come a long way since the initiative began.

We strongly support the export regulations that are in place and look forward to working hard in helping our members to comply with them.

And, finally, these educational programs and increased vigilance that I mentioned, we believe, will raise the awareness of this in the industry to new notches that have not been achieved up until this time.

One point I would make several speakers have commented about Senator Heinz's recommendation. I would just comment that I think CMA certainly would support the idea that he has advanced here. All the five elements of his proposal deserve some study, and we should work with our allies because only multilateralism will work in this situation.

Mr. Chairman, that completes the summary of my testimony. I'll be happy to respond to questions.

Chairman GLENN. Thank you very much.

Mr. Turnipseed, you are talking about creating an awareness in the industry. Do you think industry, then, would voluntarily restrict shipments if they thought they were going to be used for other purposes such as chemical weapons?

Mr. TURNIPSEED. I think they certainly would do that, Senator Glenn, and beyond that I believe that they are doing that now to a great extent. There's always that bad actor in the group, but most of our member companies are very diligent, and have very well-designed programs in place to try to comply with the regulations.

Chairman GLENN. Mr. Perle, your idea of privatizing the system; as I understand what you said—and correct me if I did not understand it correctly—you would have companies more or less approved in advance. And these companies, I presume then, would agree that they would not ship certain types of precursor materials to a certain list of countries.

Would that be the system?

Mr. PERLE. Not exactly, Senator Glenn.

Chairman GLENN. But they would be free to ship anything else, commerce as they wanted outside of that list?

Mr. PERLE. No. I had something a little different in mind. Let us take Case A2 that was referred to earlier, which looks like a classic diversion case in which, to take the first 30 ton shipment that was sold not to Iran. Iran would not have applied for a license to purchase a chemical weapons precursor, obviously. They were sold instead to Singapore; and it ultimately made its way from Singapore, or from Greece in the other case, to Iran.

Now suppose an original export license was requested for the shipment from the United States to Singapore, or to Greece, that had been accompanied by a certification provided by a private company retained by the shipper, Alcolac. The license certified that they had examined the details of this transaction; and it was a legitimate transaction.

The company providing that service would have readily discovered, I am quite sure, that there was no legitimate end-user in Singapore, in the one case, or in Greece in the other case. That is any competent company organized for this purpose would quickly have discovered that the end user was not as stated; but was in fact someone else. They might not have known who it was; but they would know that there was not a legitimate company, either in Singapore or in Greece, that was purchasing this equipment for legitimate purposes.

And, whereas the Government obviously does not check in many cases, or cannot check quickly enough to be useful to industry, if you create a market for this service, the check will, in fact, take place. And then the problem for the U.S. Government becomes not chasing thousands of licenses, but monitoring a relatively small number of approved companies that are licensed to make these certifications.

The Securities and Exchange Commission does this with initial public offerings. They lack the facilities to examine all the financial data in these documents and certify to it. So that is done by private companies whose license to do that work depends on their record of integrity and success.

I think this would immediately produce the resources necessary to do the necessary checking if we are to avoid falling into that trap. And this applies not only to diversions of this kind, but with equal importance to diversions in the nuclear and the dual-use high technology areas that affect our national security.

Chairman GLENN. It is a novel idea; but I am not sure I see how the thing would work better than the system we have now; because now we have, supposedly, intelligence from CIA and FBI domestically; and they run their own intelligence service, infiltrations, sting groups and so on.

Mr. PERLE. And yet, there are massive numbers of diversions.

Chairman GLENN. There are massive numbers of diversions; but I am not certain that a private organization would necessarily be able to do a better job of tracking that than our Government people do.

Why cannot the Government do as good a job as the private do, I guess is the question?

Mr. PERLE. Well, for one thing, they do not exist in anything like the necessary numbers. We issue, in the course of one year—Paul will know the exact figure—but between munitions licenses and dual-use exports, I would imagine we issue on the order of 100,000-plus licenses per year.

There is an end-user, a theoretical end-user, in every one of those cases; and we simply do not have the manpower to check each license. So frequently, innocent exporters are victimized. They have made a sale, without realizing it, to a front organization established for the purpose of diversion; whereas if that exporter went to a competent private company and asked for a certification, I think they would quickly uncover diversion schemes.

It seems to me the sort of scheme that is cost-free to the U.S. Government; because all the Government needs to do to permit this to happen is indicate that it will respond positively to these private certifications. And one could do it even on an experimental basis.

But I am convinced, Senator Glenn, that the private market would respond by providing this service; and the net effect would be a far more effective administration of the export control system without additional Government expenditure, and a much better service for exporters who, because they would have the option of going out and submitting a certified application, could greatly reduce the amount of time they have to wait in order to receive the license.

Chairman GLENN. Mr. Turnipseed, what would the industry think of that as a process?

Mr. TURNIPSEED. Well, again, as we have noted here on several places in our statement, if this kind of system would be put in place, in our view, it would only work if it was done multilaterally. Again, we are not going to prevent anything if we do not have the international cooperation around the world in something like this.

So I am not sure, without first exploring this kind of a regime with our allies, that we would necessarily—should go off even making formal plans about this kind of a regime.

I would certainly encourage looking at it; but I do not think that it is going to work. Some of the elements that Mr. Perle has mentioned, I think certainly most CMA-member companies and most chemical companies around the world that are—names well-known to you and others of the Committee—take it upon themselves voluntarily many times to question anything that, when an order is received from a company for a chemical that is on this control list, if we have not had prior business with them, and do not know something about the end use. And I am personally aware, just with recent discussions with a company in Germany, that they have recently looked at something like what Mr. Perle has suggested; in terms of at least verifying, to their satisfaction, who their company is shipping to and trying to ascertain, to the best of their ability, the end-use of that item.

And I am sure that even though it is not publicized a lot, there are many companies both in the U.S. and the other countries, that are doing that responsibly right now. But again, that never will prevent the bad actor from getting involved here.

Chairman GLENN. Well, I know you do stress that we have to have, as I understand it, sort of the whole world on-board before we make any agreements. And I think, in a perfect situation, that would be very desirable. We are dealing in a less-than-perfect world, though, whether we are dealing in nuclear proliferation or chemicals. We do not have any agreement with the Chinese on intermediate-range nuclear missiles, yet we make an INF agreement.

We do all sorts of things that we do not bring the whole world on-board for before we start making restrictions in certain areas. I think that is an idealistic approach to it; but I am not sure that we should hold up on some of things, whether it is Mr. Perle's idea or the Commerce and Customs approach to this thing. I am not sure we want to hold up on everything before we have the whole world on-board. That is just never going to occur, as you know.

Now, whether we come to a point where we say, "Well, we have 50 percent; we have 60 percent," I think the United States, at least as the moral leader of the world—we hope we are still in that area—that we have to take the lead in some of these things, whether we have them perfectly tied up or not.

Mr. PERLE. Could I just add one quick point? I think I may have been misunderstood. All I am saying is that where the United States Government requires a license, that license could be handled more efficiently and expeditiously, which I think is what your member companies want.

The company would have the option of submitting not only a license with unverified data, but a certification that the data contained in that license was accurate. So it imposes no additional burden; and I really do not understand the point of doing it on an international basis.

Chairman GLENN. Why do we not have the capability of making it work that well in Government; is that just inherently impossible?

Mr. **Perle**. I believe it is inherent in the nature of Government activities, Senator Glenn. I think people will do a better job of protecting their own interests where they are more directly affected than Government bureaucrats.

If a company that wants a license has the option of expediting that license by hiring somebody to go out and attest to the facts in that license application, and they can calculate that it is in their interest to do it, the Government benefits, and they benefit.

And if the alternative is to go out and hire a lot more Government officials to do this checking, I think you will get a continuation of the current system.

Chairman **Glenn**. Mr. Freedenberg, this continuing competition between Customs and Commerce, would you comment on that? Is that something that can be ironed out? Do we need new legislation? How do we knock heads to make sure that these turf fights are not getting in the way of enforcement?

Mr. **Freedenberg**. I thought that, listening to the discussion and having only 24 hours perspective on this——

Chairman **Glenn**. You are now free. You can state your mind.

Mr. **Freedenberg**. Right. I really think it can be worked out. I think it is exaggerated. It had not reached my level, for example, the Under-Secretary. We have your natural competition and esprit de corps, which was described.

I think what happens is, Commerce may, for example, feel that the Customs Service is not putting the right priority on an investigation that they want to have taking place; and they may do some checking on their own. Customs then sees it as an infringement on their turf. But if you sit down, decide what the parameters are, I think it can be done.

I think the fact that Commissioner von Raab noticed that the last 3 years has been generally turf-war free, is a good indication that it can work. So I do not see that the system needs any sort of major legislative changes.

Chairman **Glenn**. This is a joint hearing between the Permanent Subcommittee on Investigations and the parent committee, Governmental Affairs Committee. In 1984, as was already stated a little while ago, the Subcommittee recommended that this whole sack be given to Customs, period.

Would that work?

Mr. **Freedenberg**. I do not agree with that recommendation. In fact, in the 1985 Act, that was not handed over to Customs, as you know. The reason is that, particularly in terms of export-enforcement in the United States and outreach, you have a matter of priorities. Right now, the Customs Service priority, and rightly so, is the drug war. And I think there is a reasonable supplement to that investigative work when you have the Commerce Department enforcement agency which is specifically designed and specifically targeted at the diversion of technology.

We have brought in Mr. Oberholtzer, who was testifying earlier. He was the head of the FBI's electronic surveillance operation in his earlier position. We have made the organization into a very professional organization. And I think it is doing a good job. And I do not think that you heard any complaints that there was a major kind of turf war going on within the United States.

I think the question had to do with whether there was some overlapping jurisdiction abroad. And I think that sort of thing can be worked out.

Chairman GLENN. Mr. Perle, what in your opinion is the effectiveness of the demarches concerning illicit foreign trading activities involving CBW materials; are they effective at all?

Mr. PERLE. I used to refer to them, when I was at the Defense Department, as demarche-mallows; because they had about that much impact on the people to whom they were directed, which is not to say that an approach to a friendly government will not sometimes lead to results. But frequently, these demarches or requests or entreaties or pleas are ignored, particularly by some governments.

The German government, for example, just does not hear what we say; and when we shout loud enough so that they hear, they take it under advisement for years. We almost never get these issues resolved with the Germans. So I think simply appealing to their higher instincts is often not effective, and we need to use real leverage.

And at the end of the day, controlling the flow of chemical precursors, plant and equipment for the production of chemical weapons, critical materials for nuclear proliferation, and high technology for military purposes boils down to chasing leads here and there, to gathering up what information you can; frequently closing doors after it is too late; playing the percentages; trying to slow things down, stretch them out; make them more difficult and less predictable.

And there are not quick and easy solutions in this business. It is a grubby business. And the battles are fought day-in and day-out. And at some exalted diplomatic level, it is often difficult to get results.

Chairman GLENN. Just as an aside, I was over at the Wehrkunde Conference in January; and one of the things that was pointed out to me over there is a quirk of German law—not a quirk—it is in German law and has not been changed, that makes their heads of agencies or a function of government that would stop a firm from doing business, say with Libya, which was at issue at that time. We discussed it. If that person stopping the particular business from making a shipment of some kind, if that government official turns out to be wrong, he is liable for a personal damage suit.

Mr. PERLE. Even if he has acted in good faith.

Chairman GLENN. Personally, even if he thought he was carrying out international agreements or whatever; this company could come back and sue him personally.

Mr. PERLE. And the result is predictable. Bureaucrats are cautious by nature; and they are certainly not going to stick their neck out if they can be held personally responsible.

Chairman GLENN. You have got to be cautious on that one.

Mr. FREEDENBERG. If I could comment on that. That was one of the things we uncovered recently when we were doing comparisons of COCOM-nation enforcement efforts; and that really is a tremendous deterrent to any action. And there have been cases where there has been very good evidence, but where on some basis, the accused company goes after the bureaucrat. That will deter any future bureaucrat from taking action.

And what you then get is a lack of enforcement, a lack certainly of criminal penalties; because you do not want to be subject to a civil suit. So that is something that really has to be looked into by the Germans themselves. I understand they are considering a revision of their law in that area.

Mr. PERLE. If I could be so rude as to suggest, Senator Glenn, I do not think this is idiosyncratic or quirky. I think this is a deliberate German policy to erect barriers to export controls.

Chairman GLENN. I would not dispute that from what I know about it. And I do not know a whole lot about it.

Mr. FREEDENBERG. If I could make one final comment on that. It also has to do with their authoritarian past, and a desire to have a check on their government. In my own personal opinion, having worked with them over the last 3 years, certainly they have had some difficulty in the export-control area; but because of their past that they would like to make sure the government thinks two, three and four times before it takes arbitrary action against individual citizens.

So you can't understand the present laws without looking at the past as well.

Chairman GLENN. Gentlemen, we are going to have to end, even though there are many more questions. We would like to submit questions from myself and the rest of the members of the Committee for your response, if you would please. And we will include those as part of the Committee record. Obviously, we could go on for a long time. We are about one-half hour over our time now.

So we appreciate you being with us this morning. Thank you very much.

The hearing will stand in recess, subject to the call of the Chair.

[Whereupon, at 12:30 p.m., the Committee and the Subcommittee adjourned, subject to the call of the Chair.]

GERM WARS: BIOLOGICAL WEAPONS PROLIFERATION AND THE NEW GENETICS

WEDNESDAY, MAY 17, 1989

U.S. SENATE,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
AND ITS
PERMANENT SUBCOMMITTEE ON INVESTIGATIONS,
Washington, DC.

The Committee and the Subcommittee met, pursuant to notice, at 9:39 a.m., in room SD-342, Dirksen Senate Office Building, Hon. John Glenn, Chairman of the Committee on Governmental Affairs, presiding.

Present: Senators Glenn, Cohen, Levin, and Kohl.

OPENING STATEMENT OF CHAIRMAN GLENN

Chairman GLENN. The hearing will be in order.

The budget of the United States Biological Defense Research Program increased 600 percent between 1981 and 1986—$15 million to $90 million. Now, it is $73 million. This expansion has come at a time when countries unfriendly to the United States are alleged to be engaged in offensive biological weapons research.

Earlier this year, CIA Director William Webster testified that the number of countries possessing biological weapons had doubled to 10 during this decade. The Soviet Union and its clients are alleged to be engaged in activities that are in direct violation of the 1972 Biological Weapons Convention, which the Soviet Union signed in 1975.

This morning, we will review the U.S. response to the proliferation of biological weapons, and how new technologies may create what has been called a "gene gap" between the United States and the USSR.

Biological warfare is an ancient military strategy surrounded by a veil of secrecy. I think we tend too often to believe that this is something brand new that has come up just in our own time. Let me give just a few examples, hideous and horrible though they may be at this hour of the morning.

One of its earliest recorded instances of biological warfare occurred in 600 B.C. when the Athenian legislator Solon poisoned the water supply in the city of Kirrha with the noxious roots of the Helleborus plant—a primitive but effective biological toxin.

The Greeks and Romans may have used human and animal corpses to poison drinking water wells. Alexander the Great is thought to have catapulted the bodies of dead men over the walls of besieged cities, possibly as a means of spreading disease.

In the 14th century, the Tartars used the same tactics against the Genoese in the Crimea. The Tartar army, already exposed to the Black Death, hurled plague-infested cadavers over the impregnable walls of Caffa to infect the enemy population.

The fleeing Genoese brought the Black Death to Sicily, Sardinia, Corsica, and Genoa, and from there it spread throughout Italy and Europe. The plague eventually caused 25 million deaths, nearly one-third of Europe's population at the time!

During the 17th and 18th centuries, French and British soldiers deliberately infected North American Indian populations with European diseases, and later it was alleged that U.S. Government agents in the 19th century decimated the Plains Indians with smallpox by providing the tribes with trading blankets previously infected with the deadly disease.

Now, that is just going back through history, and they are hideous examples and maybe even humorous by our modern-day considerations. I am sure they weren't very humorous back in those days.

It has only been within the last century that biological agents have begun to be seriously considered as tools of war on a continuing basis. During the Second World War, Japan repeatedly attacked China with several different biological agents, targeting some 11 cities with disease-causing bacteria. Reportedly, at least 700 Chinese died from the plague alone.

Japan's secret biological warfare program, housed in an Army Anti-Epidemic Prevention and Water Supply Unit, as it was called, was located in a remote, high-security area in Japanese-occupied Manchuria. It was here that Japanese soldier-scientists conducted gruesome experiments on Russian, Chinese, American, British, and Australian prisoners of war. They also perfected culture and dispersal techniques for a large number of biological agents.

After the war, the Japanese commander traded research data to the American occupation government in exchange for immunity from war crimes prosecution, and this information later found its way to Camp Dietrick, the forerunner of the Army Medical Institute on Infectious Diseases.

The U.S. Biological Defense Research Program also has its origins in World War II. Begun in 1942, within the Chemical Warfare Service, the primary mission of this program was biological warfare research on anthrax and botulism. From the end of World War II to 1969, this program continued developing offensive weapons capabilities with human, animal, and plant pathogens.

In 1969, following a National Security Council review, President Nixon unilaterally renounced the United States' biological weapons program and ordered all stockpiles destroyed.

The National Security Council review concluded that U.S. biological warfare capabilities offered no compelling military advantages for either strategic or tactical threat or use.

In the NSC's opinion, all existing BW agents were slow-acting, unreliable, indiscriminate, unpredictable, and capable of backfiring on the attacker. In short, they were more likely to cause damage to civilian populations nearby than to enemy forces.

In 1972, the Biological Weapons Convention came into force, outlawing the development, production, stockpiling, possession, or transfer to other countries of biological agents and toxins, "whatever their origin or method of production." The only exceptions permitted the possession of small quantities necessary for "prophylactic, protective, or other peaceful purposes."

Ironically, the use of living organisms as offensive weapons can be partially traced to a series of scientific discoveries during the late 19th and early 20th centuries that allowed biologists to identify, isolate, and culture disease-causing microbes in the laboratory.

With the advent of sophisticated gene-splicing techniques, we must question whether we are on the threshold of a new and even more perverse application of scientific knowledge for odious purposes.

Today's hearing provides an opportunity to evaluate this question and look into how the Defense Department has used its increased funding to protect our military personnel from biological and toxin threat agents.

We will also hear from members of the diplomatic and scientific communities about the spread of biological agents and what can be done to halt the proliferation and development of these "hellish weapons," as they have been termed.

So I welcome all of you here today and look forward to today's testimony.

I wish, also, to commend my colleagues, Senators Kohl and Pryor, for introducing legislation last night which will, if enacted into law, implement Article IV of the 1972 Biological Weapons Convention.

The bill will make it a criminal offense to knowingly, "develop, produce, stockpile, transfer, acquire, retain, or possess any agent, toxin or delivery system for use as a weapon of mass destruction."

Moreover, the legislation makes it a criminal offense to knowingly assist a foreign state or an international organization to manufacture or otherwise acquire any agent, toxin, or delivery system for use as a weapon of mass destruction.

I became one of the cosponsors of this legislation because I feel strongly that it will send a clear message to the world of our country's very strong commitment to chemical and biological arms control. I just wanted to congratulate Senator Kohl on that.

Senator Cohen.

Senator COHEN. Mr. Chairman, I have no opening statement other than to say that while the focus of this hearing is going to be on the spread of biological weapons, I believe we also ought to explore what has taken place with respect to chemical weapons and what the Department of Defense, and perhaps State and others, have done in seeking to establish a research and development program in the field of verification of a chemical weapons ban.

But I have a number of questions I would like to pose to the panel at the appropriate time.

Chairman GLENN. Fine, very good.

Senator Kohl.

OPENING STATEMENT OF SENATOR KOHL

Senator KOHL. Thank you, Senator Glenn.

I want to thank you, Senator, for conducting this hearing on the proliferation of biological weapons. This is an important issue, and it becomes even more urgent as genetic engineering makes biological weapons easier to develop, and possibly more dangerous as well.

Biotechnology holds much promise for improving our lives, but it can also be used to devise weapons of mass destruction. For this reason, controls on proliferation are more important than ever.

Yesterday, as Senator Glenn said, I introduced a bill that can help stem the proliferation of biological weapons, the Biological Weapons Anti-Terrorism Act of 1989. I am joined in sponsoring this bill by Senators David Pryor, Mark Hatfield, Pat Leahy, and our Chairman, John Glenn.

Our measure is very similar to a bill introduced in the House by Mr. Kastenmeier, my colleague from Wisconsin. Our bill would make it a crime for Americans to assist any foreign state or organization in acquiring biological weapons. Those convicted of this offense can be fined and imprisoned for life. In addition, the Attorney General would be authorized to seek injunctions against persons who conspire to help other nations develop biological weapons.

This legislation would also close a loophole in the United States Criminal Code. Currently, there is no uniform law that makes it a crime to develop or produce germ warfare devices. The U.S. Government is prohibited from doing so by the 1972 Biological Weapons Convention, but private scientists or terrorists are technically free to manufacture these terrible creations. Our bill solves this problem.

Most importantly, however, our proposal implements the 1972 Convention. Under Article IV of the treaty, all nations must take "any necessary measures" to prohibit the development of biological weapons at home. Several nations have done this by enacting domestic criminal laws, and we should do the same.

Mr. Chairman, I look forward to this hearing. Like you, I am hoping our witnesses will suggest ways to stop weapons proliferation and to protect our security.

Thank you, Mr. Chairman.

Chairman GLENN. Thank you very much.

Our first witness this morning was to be the Honorable Wayne Owens, United States Congressman, Democrat of Utah. He is tied up in a conference right at the moment and we will entertain his testimony when he arrives after a while. We will break to let him give his testimony.

Our first panel this morning that is going to examine the nature and extent of biological weapons proliferation and the U.S. response to the threat is Ambassador H. Allen Holmes, Assistant Secretary of State for Politico-Military Affairs, Department of State; Jim Hinds, Deputy Assistant to the Secretary for Negotiations Policy, Department of Defense; and Dr. Billy Richardson, Deputy Assistant to the Secretary of Defense for Chemical Matters. He is acting in that capacity for the Department of Defense.

Ambassador Holmes, we welcome you and your colleagues here this morning. You may lead off with either an abridged version of your full testimony or the full testimony, whichever you choose. We would appreciate an abridged version, if that is possible. In any event, your entire statement will be included in the record.

TESTIMONY OF H. ALLEN HOLMES, ASSISTANT SECRETARY FOR POLITICO-MILITARY AFFAIRS, DEPARTMENT OF STATE

Ambassador HOLMES. Thank you, Mr. Chairman, and I would like to offer my full statement for inclusion in the record.[1] I will give you an abridged version.

Chairman GLENN. Without objection, your entire statement will be included.

Ambassador HOLMES. I would like to state from the outset, Mr. Chairman, that the United States is adamantly opposed to the development, production, or use of biological weapons, and we are committed to doing all we can to eliminate them from the world's arsenals.

There are two relevant international agreements, both of which have proven inadequate to prevent the proliferation of biological and toxin weapons. The 1925 Geneva Protocol prohibits the first use in war of chemical and biological weapons, but not their development, production, possession, or transfer.

The 1972 Biological and Toxin Weapons Convention prohibits the development, production, stockpiling, acquisition, retention, and transfer of biological and toxin weapons.

It is clear, however, that neither the BWC nor the Geneva Protocol have proven effective in constraining BW proliferation or for dealing with our very serious concerns about compliance.

The rapid advance of technology in the biological field has also led to another set of problems for the Convention. Recent progress in biotechnology and genetic engineering increase the potential for break-out from treaty constraints.

When the BWC was negotiated, only the United States acknowledged having biological weapons. Today, several countries are estimated to be working to achieve a BW capability. Our information on which states are involved in BW programs is based on extremely sensitive intelligence sources and methods. The intelligence community can provide you a fuller description in closed session.

We are especially concerned about the spread of BW in unstable areas, and about the possibility of these weapons falling into the hands of terrorists or into the arsenals of those states which actively support terrorist organizations.

To date, we have no evidence that any known terrorist organization has the capability to employ such weapons, nor that states supporting terrorism have supplied such weapons. Nevertheless, we cannot dismiss the possibility that terrorists could acquire BW.

The unilateral U.S. renunciation of BW in 1969 was accompanied by the recognition that maintaining a strong program to provide for BW defense is essential for national security.

The U.S. Biological Defense Research Program is in full compliance with the provisions of the Convention. It is also very open to public scrutiny. No other country even comes close in terms of the openness with which we handle this program.

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[1] See p. 439.

We must take vigorous action on the diplomatic level to deal with the problem of BW proliferation. In addition to ensuring that the states party to the BWC fulfill their commitments not to acquire BW, we must persuade additional states to make that important commitment. Currently, more than 110 states have renounced the possession and use of biological and toxin weapons by becoming parties to the Convention.

With respect to the Soviet Union, we have regularly raised concerns about compliance both through diplomatic channels and at the 1980 and 1986 review conferences. We are also considering whether export controls could help reinforce our efforts to prevent the acquisition of biological and toxin weapons by other countries.

Our preliminary impression is that such controls can play only a minor role. From a technical standpoint, the problem is much more difficult even than curbing the spread of chemical weapons.

We must continue to strive to prevent BW proliferation by reinforcing the moral, legal, and political constraints against biological warfare and, where feasible, seek to prevent states from obtaining sensitive materials and technology for BW purposes.

This will be a particularly difficult task and, quite frankly, we do not have the answers yet on how to achieve this. We do know that the United States cannot do it alone. It will require a sustained multilateral approach involving both U.S. leadership and cooperation with friends and allies.

Thank you, Mr. Chairman.

Chairman GLENN. Thank you, Mr. Ambassador.

Mr. Hinds.

TESTIMONY OF JIM HINDS, DEPUTY ASSISTANT SECRETARY FOR NEGOTIATIONS POLICY, DEPARTMENT OF DEFENSE [1]

Mr. HINDS. Mr. Chairman, I have a very short statement. I appreciate the opportunity to address this hearing, in which I would like to focus on the military problems associated with the proliferation of biological and toxin weapons.

Biological weapons in the hands of non-signatories to the BWC or to violators of the 1972 Biological and Toxin Weapons Convention are, of course, of grave concern to the Department of Defense. These weapons, as you, Mr. Chairman, have pointed out, can be insidious. They are extremely difficult to defend against, and they have spread to a number of nations over the past decade.

I think in an era of erosion of the international norms against the use of chemical weapons, the likelihood of use of biological weapons may be growing. When the BWC was signed in 1972, Ambassador Holmes mentioned that we were the only nation which admitted to the possession of biological weapons.

We believed at that time that four states were in possession of biological weapons. Today, we judge that at least 10 countries have confirmed or suspected offensive BW programs, and most of these are in the Third World.

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[1] See p. 450 for Mr. Hinds' prepared statement.

Some programs are still in the research and development stage, and weaponization and stockpiling may be years away, but other countries, such as the Soviet Union, may currently have significant offensive capabilities.

Again, as Ambassador Holmes mentioned, I think not much more can be said on the threat at an unclassified level. It is difficult to deal with this entire topic without discussing the threat, as well as our vulnerabilities at the appropriate level of classification. And I would certainly urge the Committee or individual members to allow me to arrange for such briefings on that in closed session.

Biological weapons in the hands of any potential hostile force poses a significant potential threat to U.S. military forces in Europe, in the Middle East, other parts of the world. Such weapons have the potential to cover large areas and can be employed with no warning.

On the battlefield, the onset of symptoms is likely to be the first indication that forces are under BW attack. Biological weapons offer a spectrum of effects, from incapacitation to death, and a range of employment scenarios can be envisioned, from the assassination of an individual all the way to large-area employment on the strategic level.

The development of BW programs can easily be concealed. They can be concealed within—the development can be concealed within small-scale facilities with no specific intelligence signatures, such as certain building configurations.

Indeed, BW production can be hidden in apparently legitimate operations such as pharmaceutical production plants, and biological weapons can be integrated into conventional ammunition storage. It is a very difficult thing to detect the manufacture, production or possession of such weapons.

In short, biological weapons are poor candidates for a successful arms control effort. Compliance with the Biological Weapons Convention by its parties cannot reliably be verified when a violator undertakes to conceal its activities.

The United States has foresworn the development or possession of these weapons and abides by its treaty commitments. Nevertheless, biological weapons continue to be developed elsewhere.

The continued development of these weapons by others requires that the United States maintain a defensive capability to constrain the use of biological weapons against our forces and, more importantly, to blunt the effectiveness of an attack if it should occur.

That requires us to continue effective defensive research programs designed to enable us to immunize, treat, and defensively equip our military forces, should they have to operate on a biological weapons battlefield.

Our Biological Defense Research Program exists to provide this needed protection. Its activities are efforts not only permitted under the Biological Weapons Convention, but the potential need for such programs by signatory nations is recognized in the language of the first article to the Convention.

The Article notes that prohibition of programs applies to biological weapons and toxins of types and in quantities that have no justification for prophylactic, protective, or other peaceful purposes.

Our programs are fully consistent with these provisions. The international arms control community fully recognizes the right and need of states to provide for the defense of their forces under the Biological Weapons Convention.

In the two review conferences and one experts' meeting that have been held on the BWC, the existence of U.S. defensive programs has never been an issue. We have pressed others to be as open in their defensive activities as we are in ours. In this context, I believe our programs serve as a model of openness.

Others will testify to the openness of our BDRP and to the extent of international cooperation and participation in our program, including participation by communist states. Some have questioned the growth in our Biological Defense Program over the years. I would only say that after the Biological Weapons Convention went into force, U.S. defensive programs virtually disappeared. That should have been expected.

Military development programs are threat-based, and the perception at that time was that since we had just signed and ratified a BW treaty, the threat was less. Less than 5 years later, in 1979, our growing concerns that the treaty was being violated were confirmed by, among other things, the accidental release of anthrax at the Soviet BW facility in Sverdslovsk.

The threat continues to grow and our understanding of the threat continues to grow, as I have already said, and our defensive programs have had to catch up and keep pace with the threat.

In view of our belated recognition of the threat, it is not surprising that the rate of increased spending should appear quite large. An increase from near nothing will always show as a steep change.

Some have suggested that better oversight of defensive research would be provided if the program were moved from the Department of Defense to another agency. I wanted to take the opportunity to say that I recognize that some have been suggesting that, and I would also like to say that I strongly oppose moving the Biological Defense Research Program to any other agency, such as the National Institutes of Health.

The provision of defensive materials is the responsibility of the Secretary of Defense, and that responsibility should not be divided. Moving the function elsewhere would increase costs, decrease program effectiveness, and would not result in any more openness than exists today.

Our researchers are proud of their contribution to general medical science, but the Defense Department's ultimate concern is with the effectiveness of the fighting force. We must ensure, therefore, that proper priority is given to defensive systems, and by that I mean detectors, alarms, masks, protective clothing, and so on.

In sum, our BDRP is essential to national security. It is in full compliance with the Biological Weapons Convention, and it is the most open in the world and it is properly placed within the Department of Defense.

As a ratified treaty, the Biological Weapons Convention has the force of law regarding activities of the United States Government and United States citizens. At the time of our 1975 ratification, and as late as 1986 at the BWC review conference, the Executive

Branch judgment was that no implementing legislation was required.

I think, however, that this particular policy will be reviewed in the next few weeks very seriously. It may be preliminary to make a judgment on that policy of the Executive Branch, but I think there are some developments that may have occurred to change the requirements from the earlier days.

As a personal judgment, I think that some of the views that we held earlier were based on the fact that we believed that governments were the problem, and there may be need for some legislation that would make this a problem for individuals and firms as well. That is a personal opinion. Again, I think it is much too early for me to make a judgment as to how that will come out in the review, but it is a serious issue.

I think we do have to proceed with caution in that area. There are not only essential defense interests to protect, but there are many other legitimate medical, academic, and commercial endeavors which must not inadvertently be curtailed or inhibited.

For example, it is important that legislation not discourage scientists from legitimate and peaceful research for fear of irresponsible criminal prosecution. The Department of Defense, I think, at least speaking for myself and my office, is ready to work with other Executive Branch agencies and the Congress on this issue.

Finally, I think if oversight is a concern, we in the Defense Department are also willing to work with Congress in that area, especially so that we can ensure that our vital defense research and development programs can continue, and within the Department of Defense where I believe they can receive the priority and the funding necessary for them to remain viable. I encourage this Committee in its further interests in this defensive issue.

I have with me a colleague from the Defense Department, Dr. Billy Richardson—he is from the office of the Assistant to the Secretary of Defense for Atomic Energy—who will describe the Biological Defense Research Program in more detail.

Chairman **Glenn**. Dr. Richardson.

TESTIMONY OF BILLY RICHARDSON, PH.D., ACTING DEPUTY ASSISTANT SECRETARY FOR CHEMICAL MATTERS, DEPARTMENT OF DEFENSE,[1] ACCOMPANIED BY RAY FATZ, OFFICE OF THE DIRECTOR FOR ARMY SAFETY

Dr. **Richardson**. Thank you, Mr. Chairman. I have just recently taken on the duty of Deputy Assistant to the Secretary of Defense for Chemical Matters. In that capacity, I serve as a focal point for all chemical and biological defense program research, development, and acquisition. My job is to watch over and orchestrate the actions of the military services in order to provide the best possible protection for our men and women in the armed services.

Ambassador Holmes and Mr. Hinds have just reviewed with you many of the policy and arms control issues related to biological defense. I would like to go into a little bit more detail on why we need a biological defense program and how we are safely and openly running it.

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[1] See p. 456 for Dr. Richardson's prepared statement.

Let me emphasize several critical points. As mentioned, we have a very real, growing threat to our military forces. Secondly, the biological warfare threat is more surreptitious than the chemical threat, and is therefore more difficult to deal with.

As you noted, the United States signed and ratified the 1972 Biological Weapons Convention, often known as the BWC. In compliance with that, we do not and will not produce biological weapons, nor do we perform biological weapons research or development. Since our ratification of the BWC, no other nation has accused us of developing or producing biological weapons.

The BWC has no verification mechanism. This makes it especially important to develop defenses against possible enemy use of biological weapons. Our programs are conducted under the strictest safety procedures and are unclassified to the maximum extent possible.

As a final major point, I would like to emphasize that the chemical and biological defense programs are inextricably linked and must be integrated with other programs and worldwide priorities within the Department of Defense.

Let me further elaborate on a few points. First, we are deeply concerned with the growing threat noted in Mr. Hinds' assessment. As I stated earlier, it can be very surreptitious. Normally, we would expect immediate indications of a chemical attack. Alarms would be going off; there would be incoming bombs or artillery, symptoms in exposed personnel, and so on.

However, biological weapons can be delivered by a variety of means. Some of the agents have delayed symptoms and can be delivered days or hours ahead of the main attack. Perhaps most important, we do not yet have any automatic systems capable of detecting these agents quickly enough for us to take protective measures.

Second, because of continuing proliferation and the lack of a mechanism to verify other nations' compliance with the BWC, we have to have a strong defensive program. That program includes more than just medical research. It includes many hardware programs.

As Senator Cohen mentioned, there is a linkage with the chemical defense efforts, and those in turn are linked with other development programs.

Senator COHEN. It has been a pretty weak effort, though, Dr. Richardson.

Dr. RICHARDSON. Yes, sir. We have quite a bit to do and quite a bit of effort needed to get there.

One example of the things that we are trying to work in this area of business is a new generation detector that would address both chemical and biological agents—if you would, a generic detector. Our individual and collective protection systems must protect against both biological and chemical agents.

I want to further assure you that our biological defense research is conducted in as open a manner as possible. We have no special access programs in this area—those programs commonly referred to as black programs. The only classified items are those dealing with intelligence sources or threat data, specific details of the threat such as employment concepts and plans, and any details of our own vulnerabilities to biological attack.

These programs are reviewed at a myriad of levels within the Office of Secretary of Defense, the Joint Staff, and the Department of the Army for their need, safety, and compliance with law and national policy. At any point in that review process, we can step in and take issue with any matters with which we have concern. We are willing to work with your Committee to improve that oversight process wherever needed.

Once programs are underway either at DOD or contractor laboratories, our safety systems help us stay within the strict guidelines of the National Institutes of Health and the Centers for Disease Control, or CDC, for safe handling of biological materials.

These same guidelines are used by non-defense laboratories for handling similar or even more deadly biological material. We have recently published in final or draft form many implementing safety publications.

I have with me today Mr. Ray Fatz of the Office of the Director for Army Safety, to answer questions on the safety aspects of the program.

Because of the openness of the programs and the strict accountability in the programs, we have a reputation in the international research community of being completely above-board in all our dealings. Again, since we have ratified the BWC, no nation, even the most adversarial, has accused us of violating the treaty. We intend to keep it that way.

On the idea of moving this operation out of the Department of Defense and giving it to a non-defense research organization such as NIH, we feel this is an extremely bad recommendation for several reasons.

First, the Secretary of Defense must maintain authority and control for the program. If it is moved outside of DOD, he loses that. As I have mentioned, we have interwoven biological and chemical defense with other programs and with doctrine. Only the Department of Defense can provide the materiel that best meets the needs of the military user.

Finally, the NIH is primarily concerned with disease threats to the United States. We must be concerned with global threats and the prioritization of those threats. So the most prudent action is to keep this program and its medical aspects within DOD.

As Mr. Hinds and I have noted and reiterated, we face an ever-growing, more dangerous chemical and biological threat. Since others have not foresworn and renounced offensive biological warfare capability, we owe it to our soldiers, sailors, airmen, and Marines to safely provide them protection against that threat. To do less would erode their confidence and leave the United States vulnerable to biological warfare coercion.

I am now into my third week in my current position. I am happy to take questions. I have brought with me some backup personnel and, with your forbearance, I might call on them for specific questions.

Chairman GLENN. Fine. Thank you, doctor, very much.

Before we get to questions of this panel, we will break. We do have Congressman Wayne Owens of Utah with us now. Mr. Owens, we are very glad to have you join us this morning. We know of your big interest in this particular issue and look forward to your statement.

TESTIMONY OF HON. WAYNE OWENS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF UTAH

Mr. OWENS. Thank you, Mr. Chairman. My old colleague from the House, I am glad to be here, and Senator Kohl, thank you very much for letting me come over, and my apologies for pressing business in the House having kept me from being here earlier, as had been planned.

I really want to commend you very sincerely for your interest in this very tough and unattractive issue, and I am grateful that you are taking the time to get into it. Biological warfare is an old problem.

In the 14th century, it is said that the Tartars used biological warfare by catapulting the dead bodies of their own plague-infested soldiers into enemy cities, thus ravaging entire populations and contributing to the spread of the Black Plague throughout Europe.

Now, as we approach the 21st century, some believe that the catapult and the corpse have been replaced by the missile and the vial, and it is that concern that I would like to address for a few minutes this morning.

The effective use of biological weapons could, of course, destroy entire populations. The advances in genetic engineering and other new techniques of biotechnology have vastly increased the possibility of creating microbiological weapons that could cause unspeakable diseases for which no treatment or cure can exist. We have to consider for a minute the irreparable devastation that could result from a disease as deadly and untreatable as AIDS but as contagious as the common cold.

Our greatest deterrent against biological proliferation is the 1972 Biological Weapons Convention, which outlaws the production or use of biological weapons. We are, of course, a signatory to that treaty, along with over a hundred other nations.

But international confidence in that treaty has been significantly eroded and, to our discredit, the policies of the United States are jeopardizing that treaty just when we should be working vigorously to strengthen it.

During the past 8 years, U.S. spending on the Biological Defense Program has increased by nearly 500 percent, with little justification for or oversight of this massive increase in funding. But while the explanation for pouring tens of millions of new dollars into the BDP remains unclear, the resulting alarm and suspicion we have generated throughout the world community is unequivocal.

The Army is not illegally producing biological weapons so far as I know, Mr. Chairman, but our growing enthusiasm in this country for Army-controlled biological research has convinced many observers both at home and abroad that we are heading into an offensive biological posture.

As a result, other countries are encouraged to develop, first, a defensive capability, and then tempted to create an offensive capability of their own, and it is all contributing to the exceedingly dangerous proliferation of biological weapons.

Last summer at my request, the House Foreign Affairs, Interior, and Armed Services Committees conducted an unprecedented three-committee joint hearing to evaluate the implications of our expanding biological program, which at the time included construction of a high-hazard BL–4 aerosol test facility in my home State of Utah.

That hearing produced two major conclusions. First, despite the extremely dangerous nature of the Army's work with pathogens, preparations to prevent or manage an accidental epidemic which might be caused by our own testing program is completely inadequate, bordering on irresponsible.

Second, and more important to the purpose of this hearing today, there is a severe need, a need which even DOD witnesses admitted to, for greater openness and civilian oversight throughout the entire Biological Defense Program.

Our heavy spending on research in defense, combined with a severe shortage of clear information about our program, is causing international suspicion about our goals. Unless we move to do something about this, Mr. Chairman, our growing expenditures on biological defense programs will continue to provoke international suspicion and, in the process, escalate the proliferation of biological weapons.

Since our hearings, we worked hard with experts and scientists to try to produce some legislative responses to those two problems. We have tried to draft legislation which reaches at solving them, and I have introduced two bills which I would like to speak to you very briefly about.

One addresses the measure of civilian oversight, and the second enhances openness and safety. Much of the Army's research in biomedical technology today is similar to biomedical research taking place in civilian laboratories throughout the country.

There is simply no credible reason, in my view, why such research which is completely unclassified needs to be under military control. How foolish to call our own motivations into question. Any biological research that can be effectively conducted by a civilian agency should be removed from military supervision in order to defuse unnecessary suspicion about our objectives.

Now, not all features of the Biological Defense Program should be assumed by civilians. I think it would be inappropriate, for example, to have civilian agencies developing protective masks for soldiers.

But there is nothing uniquely military about biomedical research, which is why I have introduced legislation to place the medical portion of the Biological Defense Program under the control of the National Institutes of Health.

The Army would not be excluded from working closely with the NIH or doing contract work on behalf of NIH. But NIH, under my legislation, Mr. Chairman, would have final oversight over defensive medical research, which would remove the rampant suggestion and suspicion that currently surrounds our program and encourages other nations to breach the treaty.

The NIH has an impressive history of safety. By contrast, the Army's program, to quote a report by the Senate Subcommittee on Oversight and Government Management, "appears to be fragmented," it said, "and completely inadequate." So the case for NIH supervision, I think, is obvious.

The second bill simply requires the Department of Defense to provide an annual public list published in the Federal Register identifying the location, nature, and biological safety level of each microorganism being studied in the DOD-funded Biological Research Program.

Mr. Chairman, if the Biological Defense Program is really open and unclassified—and you will hear testimony today from the DOD that it is—then it is truly ludicrous to draw suspicion to our own program by refusing to provide a complete explanation of what we are doing. By acting in secret, we only help further convince the entire world community that we have something to hide.

There is one further major consideration, the issue of safety. We have to remember that much of the Army's research involves highly lethal microorganisms, and that such research occurs in at least 29 different States throughout the country.

By refusing to provide complete information, the Army is depriving public officials of the knowledge which they vitally need to prepare for potential biological disasters. That is, frankly, a totally irresponsible risk to take with the health of American citizens.

The need to prevent, Mr. Chairman, the spread of biological weapons is unquestionable, but we must stop looking for a moment at the programs of other countries and evaluate our own.

Before we commit another $73 million to the Biological Defense Program, we should restructure the program in a way that will not undermine the Biological Weapons Convention, and we should insist that the Army stop being secretive with unclassified information, especially when that information is so vital to public health.

By employing the civilian oversight of the NIH, and by providing a comprehensive list of the microorganisms with which we are working, we will be taking two important steps toward a safer and less provocative biological defense program.

I respect the Army's goal of protecting national security, but we in Congress have an obligation to make the world a safer place to live, and inadvertently encouraging the proliferation of biological weapons does not contribute to that goal.

I appreciate the very much the chance to speak with you this morning.

Chairman **Glenn**. Thank you very much. I have no questions.

Senator Cohen, do you have any questions of Congressman Owens?

Senator **Cohen**. No.

Chairman **Glenn**. Senator Kohl, do you have any questions of Congressman Owens before we go on to the panel?

Senator **Kohl**. No, go ahead.

Chairman **Glenn**. Fine.

Thank you very much. We appreciate your coming this morning. We are glad you could be here.

Mr. **Owens**. Thank you very much, Senator.

Chairman **Glenn**. We will proceed with our questions to the panel.

I noted that in staff discussion, one of the colonels involved in the program said that though the BDRP does not create novel agents, as these things are called, it will use the agents acquired by the intelligence community in order to create vaccines and protective measures.

Now, Mr. Hinds, I know you addressed this briefly. I would like to flesh that out just a little bit because I wondered whether that doesn't constitute a breach of our treaty obligations under the 1972 Biological Weapons Convention, because Article I says, and I quote, "Each state party to this Convention undertakes never in any circumstance to develop, produce, stockpile, or otherwise acquire or retain biological agents, toxins, et cetera, nor means of delivery."

Now, how are we permitted to do our research with that being as binding as it appears to be?

Mr. **Hinds**. Mr. Chairman, I think there are probably some others who might want to chip in on an answer to that question as well, but I think one thing I mentioned in my statement—these activities for the purposes of research are also provided for in the treaty.

In fact, the first article to the Convention provides for the prohibition of programs applying to biological agents and toxins, and I quote from the article, "of types and in quantities that have no justification for prophylactic, protective, or other peaceful purposes." And I think that the research programs that we are talking about fall clearly within that provision of the article.

Now, it may be that Dr. Richardson may want to go in some more detail about the specific kinds of programs.

Chairman **Glenn**. Doctor, go ahead.

Dr. **Richardson**. I would add that what we do not do is the scale-up activities that would be necessary for an offensive program, such as the dissemination trials, the weaponization steps that one would look at, that sort of thing.

As Mr. Hinds has said, the Convention permits the use of small amounts of materials for defensive purposes, and that is necessary for some areas of the business like development of vaccines and, with present technology, development of detection techniques, for example.

Chairman **Glenn**. Are these provided for in subsequent articles or addenda to this thing that exempt them from the requirements of Article I, because Article I is rather definite and all-inclusive, it seems to me?

Mr. **Hinds**. Well, it is also—Mr. Chairman, if I may, it is also Article I that provides for justification of possession of agents for research into protective purposes. I think that is fully within the context of Article I.

Chairman **Glenn**. All right. We could get into some details on that on subsequent questions, I guess.

Ambassador Holmes, how many demarches has the United States issued concerning biological commodities since 1984?

Ambassador **Holmes**. I don't have a number to give you, Mr. Chairman, but we have certainly discussed the problems in the

1986 review of the Convention, and we have made diplomatic demarches, a number of them, including most specifically with the Soviet Union, over a period of time.

Chairman GLENN. How many, grand total? Do you have any idea how many demarches we have made to various nations, total?

Ambassador HOLMES. I have no idea, Mr. Chairman.

Chairman GLENN. Could you provide that for the record, check that?

Ambassador HOLMES. I would be happy to try to assemble that.

[The information referred to follows:]

NUMBER OF DEMARCHES ON BIOLOGICAL WEAPONS

Since 1984, the U.S. has made approximately fifty diplomatic demarches in regards to biological matters. Most of these demarches were transmitted during the U.N. investigation of "Yellow Rain" use in South East Asia. A sample list of specific demarches made to other countries are indicated below:

October 1984—Soviet Retention of BW Facility at Zagorsk.
February 1985—Confirmed BW Facility in the Soviet Union.
December 1985—Soviet Offensive Biological Weapon Capability.
August 1986—Anthrax Incident at Sverdlovsk.
July 1988—Sverdlovsk Follow-up.
December 1988—Sverdlovsk Follow-up.
January 1989—Called in Iraqi Ambassador to clarify Iraq position on BW.
February 1989—Adherence to the BWC in the Middle East.
May 1989—Sverdlovsk Follow-up.

We must continue to take vigorous action on the diplomatic level to deal with the problem of BW proliferation. Our efforts to constrain BW proliferation will require a sustained multilateral approach, involving both U.S. leadership and cooperation with friends and allies.

Chairman GLENN. Let me get back to basics here for just a moment. How do we follow these things, or do we have any—this is not chemical weapons, I know, but do we have any special chemicals or handling equipment or anything that gives us precursor warning of a nation's intent or their actual production of biological weapons?

Ambassador HOLMES. Well, I think this is a very—from what I have been told, I think this is a spongy area because it isn't the same as in chemical weapons where there are some very specific precursor chemicals that have been identified and have been placed under export control and on warning lists, such as, for example, in the Australia-led group.

But in the biological area, I am told that the materials that go into the makeup—that would be used for the production of lethal agents are dual-use and are part of the legitimate commerce for medicine that make it exceedingly difficult to identify in the way that we can do to some extent in the chemical area.

Dr. RICHARDSON. If I can add to that a bit, Mr. Chairman, I think certainly one can attempt to track biological supplies and equipment that might be used in such programs.

One of the problems in this area is the very diversity of biological agents. As the United States understands the Convention and as we implement it, everything that is not strictly a chemical not produced by living organisms is classified as an agent of biological origin and essentially a biological agent.

Therefore, you get into toxins, conceivably various hormonal materials, as well as pathogenic agents. So there is quite a diversity of things there to track, both on precursor materials as well as supplies and equipment.

Chairman GLENN. All right, thank you. We are operating under a 5-minute rule this morning so we can move right along here.

Go ahead.

Senator COHEN. Thank you, Mr. Chairman. I have a number of questions.

First, Mr. Hinds, you indicated that biological weapons are a poor candidate for successful arms control. Is it your judgment that we should be signing treaties that we can't verify?

Mr. HINDS. It is my judgment that we should not be signing treaties that we cannot verify, although personally I make some excuses for the Biological Weapons Convention because I think it is an important norm for international behavior.

Senator COHEN. Is the same true of chemical weapons?

Mr. HINDS. Of chemical weapons, we have an international norm against the use of chemical weapons. And, of course, as you know, we are negotiating on a chemical weapons ban. I do not think——

Senator COHEN. Do you think we can verify a chemical weapons treaty?

Mr. HINDS. A lot of work is required to satisfy me that we can verify a chemical weapons treaty. I think we have a lot of work ahead of us in that area.

Senator COHEN. Do you think we should be negotiating treaties that we have great skepticism as to whether we can verify?

Mr. HINDS. I think we should be negotiating the treaty to try to find a solution to all of these problems, and some of these things, I think, are global and are so complex that we only learn through the process.

Senator COHEN. Well, let me point out to that because I think you said in your statement that the erosion of international norms against the use of chemical weapons thereby precipitates the growing use of biological weapons.

The question I have is why didn't we do more than simply slap Iraq on the wrist for the use of chemical weapons against the Iranians? Perhaps, Ambassador Holmes, Mr. Hinds, you can tell us why we didn't more than simply give a verbal slap on the wrist to the Iraqis.

If we are contributing to the erosion of the threshold of use of chemical weapons, how can we come in and complain now saying, well, because the international norms aren't being adhered to, therefore we are seeing the spread of biological weapons?

Why aren't we doing more? Where was the complaint coming out of State for that?

Mr. HINDS. I would just make a comment on that. I think that I would say that in certain senses we have done more than deliver a slap on the wrist to Iraq, but I do think myself that some of it was done too late.

Senator COHEN. Well, I will have more to say about Iraq, but what about the accidental release of anthrax in 1979 in the Soviet Union? What did we do about that? What about the recent use of gas upon the Soviet citizens in Tbilisi?

What are we doing about that in terms of seeking international support for condemnation, and what exactly are we doing to condemn the use when we see it of chemical weapons, other than complaining about the fact that the norms are degrading internationally?

Mr. HINDS. I think maybe Ambassador Holmes can add something specifically to that point.

Ambassador HOLMES. Let me try to answer that, Senator. First of all, with respect to Iraq and the Iran-Iraq war, the United States did condemn the use of gas weapons in that war. We also vigorously criticized and talked to the Iraqi government about it.

We have gotten from them a commitment not to use chemical weapons. They did participate in the Paris conference, where they joined with the rest of the world in re-pledging to the prohibition of use contained in the 1925 Convention.

And as far as the Soviet Union is concerned, the reported use of——

Senator COHEN. Anthrax.

Ambassador HOLMES [continuing]. Strong riot-control agents in Georgia—the Soviet Union is conducting investigations. As a matter of fact, I had a private exchange with a senior official on that question when I was in Moscow last week, and they have some preliminary evidence of the materials that were used and they are conducting a criminal investigation by the state's prosecutor.

Senator COHEN. My time is running rather quickly here. Let me say I don't think we do anywhere near enough in raising our voices and seeking sanctions against those countries, including Iraq and others, who have resorted to chemical weapons. And I think as a result of our relative lack of anger over that, we are indirectly contributing to the spread of chemical weapons.

Let me direct a couple of quick questions, if I might, Mr. Chairman, to Dr. Richardson. You were the technical director of the Army's Chemical Research, Development & Engineering Center, and I think you are aware that for a number of years the Senate has been proposing a program to develop and demonstrate the technology to monitor a chemical weapons ban.

OSD has been opposed to that research program. We have included, by the way, in the Defense authorization bill $5 million for the past several years which keeps getting knocked out by the Office of the Secretary of Defense.

My question is, when I look at your statement, Dr. Richardson, page 4, you say "One of our most important hardware projects is the development of a generic detection and warning system for both chemical and biological agents." But I noticed in your budget you reduced the funding for that particular program.

Now, how do we reconcile this being one of the most important hardware projects in the Department and then the budget has been reduced?

Dr. RICHARDSON. Sir, on the point of reducing that, it is a matter of balancing needs for many different things. Of course, physical protection such as masks is a very immediate requirement, as are decontaminants and that sort of thing. So it is a matter of trying to stretch limited resources across many needs. The detector I mentioned in my testimony was for battlefield use, not for treaty verification.

Senator **Cohen**. Well, let me give you a personal opinion that I have been working—Senator Glenn and I have been advocates on behalf of the Defense Department's program on binaries. So it is not that we are opposed to having an adequate defense and deterrent.

But I must tell you that I find it fairly outrageous when I see a situation in which we are tabling a chemical weapons treaty in Geneva, we don't have the adequate technical capability today to verify compliance with a treaty, and when we try to put money into the programs, the Department of Defense takes it out. Now, I don't understand that kind of a policy.

Dr. **Richardson**. Sir, let me address the issue on verification a bit. I can't speak for what past DOD positions have been—OSD positions on verification. I do know that I have had some dialogue every day for the past 7 working days with Mr. Hinds' staff and others on verification things.

I think verification——

Senator **Cohen**. We are talking about a $5 million program to develop the technology that is necessary to get some kind of devices that will help to monitor the presence of chemical weapons—$5 million out of that budget, and it keeps getting deleted and I don't understand why.

Dr. **Richardson**. Sir, I think there are countervening requirements. I think there are policy issues involved.

Senator **Cohen**. If there are countervening requirements, then this statement on page 4 is meaningless.

My time is long expired. I appreciate your patience.

Dr. **Richardson**. We will take your comments under advisement, sir, and get back to you.

Chairman **Glenn**. Do you want to follow up, Bill? Go ahead.

Senator **Cohen**. I will come back.

Chairman **Glenn**. I would only say before we go to Senator Kohl that that is the reason why we see proposals to give this program—the BDRP—to NIH or give it to somebody else if it is not going to get done across the river.

You both made a point in your original testimony of wanting to keep this program in the Pentagon; the Pentagon wants to keep control of this. If you are not doing anything about it, we are going to give it to somebody else. As Bill points out, that has gone on for 3 years now. We are not likely to go ahead and continue to support the Pentagon in what they want in this area with a budget of $5 million, as he said—you know, that is pocket change around here compared to a $300 billion budget over there.

And unless you are going to do something with it over there, we are probably going to take it away from you and give it to somebody else who will do something about it and will accept the money and put it in their budget. That is sort of a summary of the whole situation.

Senator Kohl.

Senator **Kohl**. I would like to get some information just as a layman on how defensive research becomes offensive. With the work that you do with respect to defensive biological warfare insulation, how quick and easy is it to turn that from a defensive capability into an offensive capability?

Mr. **Hinds**. Could I ask Dr. Richardson to reply to that? I am not really a technician at all in this area.

Senator **Kohl**. Yes, sir, Dr. Richardson.

Dr. **Richardson**. It would vary with the type of system that one was looking at, of course, but—from very fundamental lab work on an offensive side, you would have to look at scale-up to produce quantities of material, look at how you control and disseminate the agent, look at the weapons integration aspects of that, and what type of projectile or missile that you would put it into.

It can be an extremely involved process. I think the Stockholm Peace Research Institute, or SPRI, some years ago put together a list of steps that would be required to do this and there were about 20 such steps, including those I have mentioned, and some administrative actions and that kind of thing. I think one of the indications of the open aspects of our program is that we simply don't do those kinds of steps.

On defensive aspects, I think most countries in the world have some kind of biological defense effort. That may be as small as providing protective masks, decontamination equipment, on up to more extensive work on vaccines.

There is a huge step from masks and vaccines and similar defensive work to projectiles, missiles, that type of activity.

Senator **Kohl**. Well, the huge step—let me see if I can't understand more precisely what you know because you are an expert.

We are not deficient in our knowledge about what BW means and how it is done and how it is produced and how other countries produce it and how we could produce it. I am sure there are people in our Defense Department who are very sophisticated and very expert at this.

If you knew or if our country knew that we had to fight fire with fire and we were in a situation where an adversary was using biological warfare on our troops and we decided, for whatever reason, we had to respond, what kind of a turnaround time is involved for this country? With our capabilities, with our sophistication, with our knowledge, what would you be talking about, a day, a week, a month, a year, 10 years?

Dr. **Richardson**. In this area, sir, there is no turnaround time for us. We have said that we will not use, under any circumstances, biological agents. How we would respond to a biological attack on ourselves or on our allies is a matter of policies, and some aspects of that are classified and cannot be discussed in open forum.

Senator **Kohl**. I understand, but if you were instructed by your superiors, for whatever reason, that we wanted to have an offensive biological capability, I still haven't heard anything giving me some indication as to how it works.

Dr. **Richardson**. Yes, sir.

Senator **Kohl**. You know how it works. How does that work?

Dr. **Richardson**. First, I think it would take several years. We have lost by now most of the expertise that existed when we did have an offensive program prior to the late 1960s.

We would have to look at, as I say, technology and people to scale up to larger quantities of material; and with somewhat more difficulty, I think, look at dissemination techniques and integration with weapons. I think it would take several years to get into that mode.

Senator KOHL. Well, that is interesting. So you are saying, in your judgment, we are several years—if, for whatever reason, we wanted to have a capability, we would be several years away from it at this point?

Dr. RICHARDSON. That is my personal judgment. Now, we could give you a more studied response for the record, but we simply do not contemplate that kind of activity because we adhere very religiously to the policy that we do nothing in the area of biological warfare.

Senator KOHL. That is interesting. Thank you.

Mr. Hinds, you have some familiarity with the bill that I and others have introduced. Do you have any level of discomfort in supporting that bill, helping us to get it passed?

Mr. HINDS. I would like, if I could, to take one quick opportunity to say that on the last question, one of the first things that we would have to do is to go to Congress for reprogramming authority, which might take a few years as well. [Laughter.] Your question may have been directed to a completely sub rosa operation or something like that, but I think that would be a fairly great problem.

Also, I don't want to take your time. I would also like to, Mr. Chairman, if I could, have some time later to respond to the point about the verification studies money somewhat.

But on the—I have distracted myself now to the point where I have forgotten what the question was.

Senator KOHL. I asked you about the bill that——

Mr. HINDS. Oh, yes, sir. I think I am really out of my realm to talk about the specific bill that we are considering right now. Again, I gave some indication of my own personal judgment that because of the biotechnology explosion over the past years and our growing awareness, if not a growing threat, from the proliferation of biological weapons, we probably should be looking more closely and worrying more about individuals and firms being involved as opposed to government being involved.

I think we were convinced that as a Government, we were not going to have any problem in implementing the Biological Weapons Convention. Other than that, to say, in my personal view, I would like to work on the specific legislation, but I am way ahead of the Government in that regard.

Senator KOHL. Ambassador Holmes.

Ambassador HOLMES. Senator, I would just like to say for the record that the Department of State looks favorably on this bill. We think that there is a need for something like this. We would like to have an opportunity to study it and to work with the Committee.

Senator KOHL. Thank you, Senator Glenn.

Chairman GLENN. Thank you.

Just to follow up on that a little bit as far as this legislation goes, Mr. Hinds, were your personal views altered in your testimony by OMB with regard to that particular legislation? Your statements had to be submitted to OMB for clearance, I believe, Is that correct?

Mr. HINDS. Yes, sir.

Chairman GLENN. All of you?

Dr. RICHARDSON. That is correct.

Ambassador HOLMES. Yes.

Mr. HINDS. It was not altered. However, it was the judgment of the interagency process that it was really too preliminary for me to go out in direct support of any specific bill or legislation because we had not actually completed the review on that very subject.

Chairman GLENN. Well, I understand that OMB has to coordinate policy, but I think also I would note that the original statement had these words in it: "The enactment of carefully drafted laws enabling the imposition of penalties on individuals and corporations whose activities violate the BWC would be useful," which is an answer to Senator Kohl's statement, which indicates support for it.

That was taken out, and in its place it now says, "For example, it is important that legislation not discourage scientists from legitimate and peaceful research for fear of irresponsible criminal prosecution," which is quite a different line of thought.

Mr. HINDS. Personally, I believe both of those statements that you just read.

Chairman GLENN. You can't believe in both of them.

Mr. HINDS. I don't like irresponsible legislation.

Chairman GLENN. I guess you could believe in both of them, also, but one was taken out and the other was inserted for it which indicates a whole different thrust. And I understand there has been a discussion between OMB and Defense, and that perhaps the administration policy is not settled down on this issue yet. But I just wanted to point out that your original statement was changed considerably in that regard.

We have, under Article VI of the Convention, a complete right to lodge officially complaints when there are violations of the BWC. Why didn't we lodge those complaints on the Soviet Union, Laos, Vietnam?

Ambassador Holmes, to follow up on Senator Cohen, we just do little wrist taps or something here. Why didn't we file an official complaint?

Ambassador HOLMES. We have, Mr. Chairman, under Article V of the treaty, sought bilateral consultations with the Soviets to seek explanations on all these questions. And we also have, in the review conferences—in the 5-year review conferences, we have also sought answers to these violations.

I might add that——

Chairman GLENN. But we can file an official complaint with the UN under this. Why don't we do that when we know there are violations, instead of bilateral talks and discussions at other meetings and things like that? Why don't we file them?

If we are really as concerned as all your statements indicate we are concerned, it would seem to me we would be taking tougher action than we are taking.

Ambassador HOLMES. Our basic approach is to try to get the facts before we go public with accusations of violations.

Chairman GLENN. Have we lacked the facts?

Ambassador HOLMES. Yes.

Chairman **Glenn**. Have we lacked sufficient evidence in these cases that we could not file an official complaint?

Ambassador **Holmes**. To my understanding, we have never been able to get sufficient information to establish the facts on these violations, and so we have pursued the question through bilateral contacts.

We are continuing—we have never gotten, for example, a satisfactory explanation on the 1979 outbreak of pulmonary anthrax at Sverdlovsk. But what we are now trying to do is to get more information on the facility, the biological facility at Sverdlovsk, and we are pursuing that.

Chairman **Glenn**. Do we have any information that any researchers or firms have knowingly sold biological agents with military applications to any foreign agents, Ambassador Holmes?

Ambassador **Holmes**. Mr. Chairman, I have no information in that regard.

Chairman **Glenn**. Mr. Hinds?

Mr. **Hinds**. No, sir.

Chairman **Glenn**. Dr. Richardson?

Dr. **Richardson**. I do not have that information.

Chairman **Glenn**. I see you are consulting with other people. Do any of your other experts there have information that any of this stuff has actually been sold to anybody or has gotten away from us, whether sold or not?

Ambassador **Holmes**. Mr. Chairman, I would like to take that question and provide a more considered answer in writing.

Chairman **Glenn**. All right, fine. We will have that, then, for the record.

[The information referred to follows:]

There are currently two international agreements that deal with biological weapons (BW), The 1925 Geneva Protocol and The 1972 Biological and Toxin Weapons Convention (BWC).

The Geneva Protocol bans use of toxin weapons.

The BWC bans research, production, storage, transfer and use of BW. But it does permit production of biological agents and toxins in quantities required to develop protective measures. Foreign countries have purchased from the United States small quantities of biological materials, such as cultures, for research as permitted by article I of this convention. Current regulations governing the sale of biological materials are being reviewed by the Commerce Department.

To date, we have no evidence that any known terrorist organization has the capability to use biological weapons, nor that states supporting terrorism have acquired ingredients for such weapons from the U.S.; however, we cannot dismiss the possibility that terrorists could acquire BW.

Biological weapons programs are inherently difficult to monitor. The types of materials and equipment used are common to legitimate bio-medical activities and facilities, and thus do not have a distinct signature that would enable us to identify their intended end-use.

Our overall goal remains the complete elimination of biological weapons. We are considering whether more stringent export controls could help reinforce our efforts to prevent the development of biological and toxin weapons capabilities by other countries. Because of the dual-use problem noted above, our preliminary impression is that export controls can play only a minor role in addressing the BW proliferation problem.

We must continue to strive to prevent BW proliferation by reinforcing the moral, legal and political inhibitions against proliferation and use of BW. Where feasible, we should seek to prevent states from obtaining materials and technology that might be applied for BW production purposes. Eliminating BW will be a particularly difficult task and, quite frankly, we do not have all the answers yet on how to achieve this.

Chairman GLENN. Also, a while ago Dr. Richardson volunteered that he would send additional information in response to Senator Kohl's question. I forget what that was. Do you remember what it was? He indicated, I believe, that he would be glad to provide that for the record and I wanted to make sure we did that. I don't know what that was.

Dr. RICHARDSON. Senator Kohl, was that on steps that would be necessary——

Senator KOHL. Yes. I had asked how you get from here to there, and how long it takes.

Dr. RICHARDSON. I think we could provide for the record extracts of things published by SPRI that show what those steps are.

Chairman GLENN. Fine.

[Information follows:]

SPRI WEAPONS DEVELOPMENT STEPS

Taking the idea for a new weapon and developing that idea into an operational capability requires a process containing at least 26 steps. A study by the Stockholm Peace Research Institute identified the following steps for developing an offensive chemical or biological warfare (CBW) capability.

1. Policy review of the pros and cons of developing an offensive CBW effort and a decision by the government to proceed or continue.
2. Preparation of detailed budgetary estimates for research and development (R&D).
3. Determining the number of R&D personnel.
4. Recruitment of R&D personnel.
5. Organization of research facilities.
6. Selection of projects for research.
7. Selection of research projects for further development.
8. Organization of development facilities.
9. Development of agent manufacturing techniques.
10. Development of munitions, including test and evaluation.
11. Standardization of weapons for possible procurement.
12. Development of employment doctrine.
13. Preparation of budgetary estimates for procurement and maintenance.
14. Voting of procurement and maintenance budgets.
15. Selection of standardized materiel.
16. Importation (if any) of materiel.
17. Procurement of raw materials.
18. Manufacture of agents.
19. Bulk transportation of agents.
20. Bulk storage of agents.
21. Manufacture of munitions.
22. Filling of munitions with agent (possibly included with item 18).
23. Storage of filled munitions.
24. Deployment of materiel in forward areas.
25. Training of individual troops in offensive techniques.
26. Troops maneuvers include offensive agent exercises.

Chairman GLENN. My time on the second round is up.

Senator Cohen.

Senator COHEN. Mr. Chairman, I just want to come back. I don't want our witnesses to take anything I have said personally, because I have worked very closely with Ambassador Holmes, though not with the others yet.

But I must tell you that I think that we have to raise high the roof beam if we hope in any way to discourage countries from using chemical and/or biological weapons, and I think Iraq got away with murder—literally got away with murder—and all they said was, well, we won't do it again.

I think that the international community, with the United States in a leadership role, should have been out there and imposed severe penalties for having done that.

And as a result, I think we are seeing other countries—we are seeing a greater spread of chemical weapons, not only biological, but a greater spread of chemical weapons, because we have tolerated it with very little response in the way of effective sanctions coming out.

Ambassador Holmes, you have indicated that we don't have sufficient proof. We tend to approach this as if it were a criminal case, with the burden of proof being of such a degree that it would be virtually impossible to get the information necessary to present this to a world court—sort of a forum. I don't think we can take this attitude if we hope to have any hope of reducing the threat of chemical weapons.

On the subject of chemical weapons or the signing of treaties that cannot be verified, Mr. Hinds, you wanted to offer some comments. I will give you my opinion, first of all.

I don't think we should be signing treaties and negotiating treaties that can't be verified. I think we are misleading the American people if we undertake to submit treaties that we believe to be inherently unverifiable.

Now, there is a body of opinion within the Pentagon that believes that you cannot adequately verify a chemical weapons treaty. Well, if that is the case, we shouldn't be submitting a treaty, because the first thing the Soviets would do would be to accept our proposal in Geneva saying, we like it very much, thank you, and let us go forward. And yet we would have this reservation within the Pentagon saying, but it can't be verified. And what do we do at that particular point?

Now, I believe there are technologies and procedures that can be developed that can make a serious contribution to the monitoring of chemical weapons. And I am distressed, I must tell you, when I put in a very small amount of money, $5 million, to undertake the beginning of the program—and I note that the Secretary of Defense, in 1987, established a DOD requirement for this program in his defense guidance—and still, year after year, it keeps getting knocked out.

And I have to ask, what are we doing? Are we just spinning wheels up here, complaining about it, talking about the threat, and yet not doing anything at the international level, the diplomatic level, and not doing anything at the scientific level?

I don't want to confuse the two between taking things out of defense for biological research programs and those of chemical programs. But it seems to me that there has been very little focus and sustained support coming from within DOD itself.

And if that is going to be the case, then I want to know about it now because I don't want to be out there supporting chemical weapons treaties.

Dr. **Richardson**. Senator Cohen, could I respond to you on verification?

Senator **Cohen**. Yes.

Dr. **Richardson**. We are very aware and very appreciative of your support in that area of business. I know you have been interested in that area for a number of years, and your support has been very valuable.

Senator COHEN. Well, the Defense Department doesn't hesitate to come to me when they need help on this issue. We are the ones out on the front line, Senator Glenn and myself, having to reconcile differences with the House of Representatives on these issues.

And I just don't understand the resistance to funding a program which I think, according to your statement, would be very important as far as providing some kind of a generic detector program that would have an impact upon biological verification as well as chemical.

Dr. RICHARDSON. My honest understanding as I came into the room today was that funds that had been set up for verification had been authorized but not appropriated. I will look into and get smart in a hurry on what we have done within OSD and DOD on that effort.

I know we have, over the last several years, taken a very small amount of money, a few hundred thousand dollars, and used it for the study of verification technologies. We have a few people up at Edgewood who track the program and who look at what could be done.

But, I will look into your interest and see what further we can do.

Senator COHEN. Mr. Hinds, you wanted to respond about verification.

Mr. HINDS. I just wanted to make a very short response, and I have actually probably——

Senator COHEN. Make a long response because I don't have much time left and you might as well use whatever I have got left.

Mr. HINDS. Thank you. First of all, I appreciate your views on the negotiation of treaties, and share very many of them. On the verification funding question, I may be responding more to the Washington Post article of, I think, last week than I am to the comments that were made here.

But I did want to say that the funding problem within the Department of Defense has not been a policy problem. Sometimes, as a matter of fact, I have to say that it has been a mystery to me how some of these small amounts have disappeared from the funding.

In the policy side of the Office of the Secretary of Defense, we have made a strong effort in the last 2 years, the only years that I am really familiar with, to support funding of verification, specifically for chemical weapons verification, at a much greater level.

Senator COHEN. Mr. Hinds, the Department of Defense spills $5 million over a weekend, maybe a night. I don't think we can dismiss the $5 million on the basis of budget.

Mr. HINDS. I say again that to me it is sometimes a mystery as to how that happens.

Senator COHEN. I think it is policy. I think there has been a policy of giving lip service to the program in the past. It has not been a budgetary problem. It has been a lip service problem, and the question is, is that going to change. If it is not going to change, then we are wasting our time coming forward and talking about the problem.

Mr. HINDS. Well, I know that I have just signed a very strong memorandum of support for a $15 million funding program to be used within the Office of the Secretary of Defense for scientific research on verification technologies.

Senator COHEN. I am pleased to hear it. The red light is on. You are saved.

Chairman GLENN. Thank you. Let me just comment on Senator Cohen's emphasis on verification. If we are going to have treaties, I agree with that 100 percent. Now, in the nuclear field, we want verification, but we say if we don't get the verification, we have a big deterrent because we have a very imposing nuclear capability ourselves.

The problem here in this case is you are telling us we don't have that and couldn't develop it for several years. So we don't have that deterrent, so verification, if we are going to have a treaty, becomes absolutely critical.

Senator Kohl.

Senator KOHL. Dr. Richardson, you have said that disseminating biological weapons is very easy. You can do it by missile, in food, or by animals. Conducting biological warfare is not the hardest thing in the world to do.

Is there any real hope of developing an effective defense capability against biological warfare?

Dr. RICHARDSON. Certainly one can do things to help. On physical protection, most of the biologicals one would be concerned with infect by inhalation. So mask and protective systems help. Certainly, some effects can be prevented by vaccine immunization.

You can ameliorate the possible effects. Like most areas of warfare, whether or not you can completely eliminate the threat, completely protect against any one agent, in most cases is probably unlikely. But you can take actions which make it much more difficult to have an effective biological attack imposed on you.

Other people have posed the notion that it is much easier to develop agents than it is defenses, and that is certainly true. It is much faster to develop agents than, say, vaccines, and that makes it a very difficult problem.

So I suppose the sum answer to your question, Senator Kohl, is it is a very challenging task.

Senator KOHL. And would you think that there is in this world the capability for conducting biological warfare against the population of the United States today? Is there that capability in this world?

Dr. RICHARDSON. Sir, the indications and evidence on that, I think, would probably be better covered by intelligence personnel in another forum. I would say that, certainly, there have been indications of such things in the past.

I think most of the growing threat that we have seen in recent years, in my view, takes biological toward a more tactical application, toward armed forces and that sort of thing.

But as far as a real assessment on your question, I should defer on that and perhaps ask intelligence personnel to brief you in closed session.

Senator KOHL. Our research is for the military—we don't do any research in terms of civilian protection against biological warfare in this country, is that correct?

Dr. RICHARDSON. Sir, we focus on the military population. By executive order issued last year, the protection of plants and animals comes under the U.S. Department of Agriculture. Protection of the civilian population comes under Health and Human Services.

However, it is important that much of what we do goes to the civilian applications as well. Colonel Dave Huxsoll either now or later could give you quite a few examples of things that his laboratory has turned over to the civilian community for application.

Senator KOHL. Thank you. Thank you, Senator Glenn.

Chairman GLENN. You couldn't answer the question as to whether you feel there is a threat to us or not?

Dr. RICHARDSON. I think there is a threat, sir. The detailed nature of the threat against the civilian population, a large-scale threat, as Senator Kohl covered, I would not want to go into detail on in this forum.

Chairman GLENN. I understand that, but you do think there is a threat of biological warfare to the United States of America?

Dr. RICHARDSON. Yes, sir, I very definitely think there is a threat, and I think that threat is increasing. The nature of the threat is also changing so that you have more versatility on the part of an adversary.

Chairman GLENN. Okay, fine.

Senator Levin.

Senator LEVIN. Thank you, Mr. Chairman.

The threat to our population from biological warfare that you have described is indeed a real one. There is also a threat to our population from our own laboratories that are using biological agents in an unsafe way in order to help them create defenses against biological warfare.

Your predecessor, Dr. Welch, and the Subcommittee which I chair and on which Senator Cohen is the ranking Republican have worked very hard on the safety issue of our own labs, and I would like to talk to you, Dr. Richardson, about these safety concerns relative to the way in which we are using biological agents, some of which, again, are highly deadly agents, in our own laboratories.

In July of 1988, the Department of Defense promised to develop a comprehensive safety regulation for the biological program, and in January of 1989 the DOD staff met with our staff and showed us a draft regulation which seemed complete. But your statement today suggests that this regulation won't be published until the end of the year.

My question is what is the timetable on that, and will you be publishing a proposed regulation in the Federal Register so that there can be a period for public comment?

Dr. RICHARDSON. Senator Levin, let me open my comments by saying certainly we do not feel our labs are a threat in the safety area. We also appreciate your interest in the area. I have read the record of testimony of the sessions last year where you delved into this so deeply and I think you made many excellent comments.

I also think we have made good progress since that time on regulations and pamphlets. As I mentioned earlier, I have Mr. Ray Fatz of the Office of the Director of Army Safety here, and he watches over that program from the standpoint of the Army's executive agent role.

Let me ask Ray to cover with you where that progress stands today.

Senator LEVIN. I just need a timetable as to when you will be publishing a reg. Will it be a proposed reg, a draft reg, a final reg? That is all I need.

Mr. FATZ. Sir, the regulation should be published and on the street by the end of the year.

Senator LEVIN. Will that be a proposed reg?

Mr. FATZ. The regulation, sir, will be given before it is published to CDC for review.

Senator LEVIN. Will there be an opportunity for public comment before it is published, then?

Mr. FATZ. We don't usually do that with our regulations, sir.

Senator LEVIN. Is this a final reg?

Mr. FATZ. It is in draft form now and is being staffed throughout the Army.

Senator LEVIN. As a final regulation?

Mr. FATZ. We will take the comments from the staffing and include that in the regulation, and give it to CDC for review.

Senator LEVIN. I would suggest that if you are going to publish a final reg at the end of the year that you find ways of getting public input.

Mr. FATZ. Okay, sir.

Senator LEVIN. By the way, Dr. Richardson, your reference to threatening, I think, is intended to reflect the following belief on my part—I think it is a belief that you would share—which is that any unsafe handling of biological agents by our own labs is threatening. That is what was intended by that word. Would you agree with that?

Dr. RICHARDSON. I think safety is an area warranting heavy attention and caution, and we try to do that.

Senator LEVIN. All right.

Dr. RICHARDSON. I think it is important that, certainly, in the last 20 years we have had no fatalities and no serious incidents. Colonel Huxsoll could give you more details on that.

Senator LEVIN. Is there any reason why that final reg can't have fairly broad circulation?

Dr. RICHARDSON. Sir, I think one thing, certainly, we can do is work with your staff on looking through the regulation and considering any ideas you have. On routine procedure and circulation, I rely on Ray to tell me what the procedure is.

Senator LEVIN. Will you work with us on a way to get some public comment on that?

Mr. FATZ. Yes, sir.

Senator LEVIN. Okay. On the safety inspections issue, your statement, Dr. Richardson, says that the DOD will fully implement the Centers for Disease Control biosafety guidelines with formal reviews and inspections when the final regulation is published.

The Department of Defense issued a directive in May of 1988, which is a year ago, stating that it would begin safety inspections on all labs in the biological program, and I am wondering why the delay.

Dr. RICHARDSON. Sir, I think the delay is a matter of semantics and perhaps my inexperience at stating the issue. The Army as you noted, did publish a directive. We are in full compliance with those requirements.

Senator LEVIN. So those inspections have begun?

Dr. RICHARDSON. That is correct.

Senator LEVIN. That is fine. Your statement also says that the Department of Defense is creating within the Army Medical Research and Development Command a safety department with four safety professionals. Does that office now exist? Again, that was promised to us last July.

Dr. RICHARDSON. I will start the answer to that and may ask Ray to amplify. But, yes, it does exist, and that office of four people is at Medical R & D Command headquarters at Fort Dietrick.

In Colonel Huxsoll's organization, which is subordinate to that headquarters, he has set up an office of seven people.

Senator LEVIN. That is a fine answer. My time is up. I want to express the hope, Dr. Richardson, that we will be able to work closely with you on this issue the way we did with your predecessor.

Dr. RICHARDSON. I look forward to that, sir. Thank you.

Chairman GLENN. If you have any more, go ahead.

Senator LEVIN. I just have one more question—thank you, Mr. Chairman—and that has to do with OSHA safety inspections. Your statement reaffirms an offer which was made, I believe, last July by Dr. Welch to allow for OSHA safety inspections of DOD labs, and that is a key component of the biological safety program since, until now, the Department of Defense was the only agency which has inspected its own labs.

I am wondering if you could just briefly let us know what is the status of OSHA inspections.

Dr. RICHARDSON. Yes, sir. Action was taken on that. OSHA was contacted. Let me let Ray tell you about the procedure.

Mr. FATZ. Yes, sir. OSHA was contacted and we had several briefings with them, and we have offered our labs on orientation visits, which they have done, and they are now putting a plan together that they will submit to you and they expect to do some inspections this year.

Senator LEVIN. That is fine. Thank you. Just keep us informed on that, if you would. Thank you, Mr. Chairman.

Chairman GLENN. Thank you very much. Obviously, we could keep on going all day, gentlemen, with questions here. We appreciate your being with us here this morning. We may have additional questions submitted to you by other members of the Committee that we will want to get back to you on. We will have to move along to our second panel at this point.

Our second panel deals with the scientific community's assessment of biological agent proliferation and the U.S. response. Our witnesses are Col. David Huxsoll, Commander, U.S. Army Medical Research Institute of Infectious Diseases, Department of the Army; Dr. Keith Yamamoto, University of California, San Francisco; Dr. Matthew Meselson, Harvard University, Cambridge, Massachusetts; Dr. Jonathan King, MIT, Cambridge, Massachusetts; and Dr. Victor Sidel, Montefiore Medical Center in the Bronx, New York.

If you gentleman would come to the table, we would appreciate it. Thank you, gentlemen. Colonel Huxsoll, if you will lead off, please, we would appreciate it. We would appreciate an abridged version of your longer remarks. Your longer remarks will be included in the record, but so we have time enough for some discussion here, we would appreciate an abbreviated version of the remarks.

Colonel Huxsoll.

TESTIMONY OF COL. DAVID L. HUXSOLL, COMMANDER, U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES, DEPARTMENT OF THE ARMY

Colonel Huxsoll. Thank you, Mr. Chairman. As you have already noted, I am Col. David L. Huxsoll, Commander of the U.S. Army Medical Research Institute of Infectious Diseases.

The Institute is the lead laboratory of the U.S. Army Medical Research and Development Command responsible for the medical component of the Biological Defense Research Program. The Army conducts the BDRP and coordinates with the other services through a joint service agreement.

I am pleased to be here to provide information on the BDRP, and specifically on how the program relates to the subject of this hearing, the proliferation of biological weapons.

I have provided written testimony and I will not cover it in detail. As you have suggested, sir, I do offer my complete written testimony for inclusion in the record.[1]

I would like to emphasize that the BDRP does not conduct any research and development related to offensive biological warfare, as others have already said. We have no biological weapons capabilities or programs.

The vaccine and drug research that we conduct is not only in compliance, but in full support of the Biological Weapons Convention, and with the existing U.S. policy that was first enunciated in 1969.

We are the only country to have made it clear to the world over the past 20 years that we do have a specific program dedicated to developing counter-measures to biological warfare, and that the results of that research and thorough descriptions of the entire program are available to all who read scientific journals, all who care to visit the Institute—in short, to all who request such information.

It is because of this tradition of openness that we have received so much attention. While many of our closest allies kept their biological defense programs in low profile, we have welcomed the press and opened our laboratories to scientific and public scrutiny.

What have we gained with this openness? The U.S. charted the course for the Biological Weapons Convention of 1972. The confidence-building measures adopted by the Second Review Conference in 1986 are actions that had long been part of the Army's custom—the exchange of scientists and research results; information on biological defense research laboratories, symposia, and conferences; and information on disease outbreaks. It is the open atmosphere and assurance of purpose of the BDRP that permits the Federal Government access to some of the best science and scientists.

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[1] See p. 464.

We have also gained the interest of many of the general public and a few groups who purport to work in the public interest. Some of these public interest groups and a small number of self-appointed experts have done a great deal to increase the attention focused on the BDRP.

It is interesting that most of these groups and individuals exist solely to investigate perceived dangers, yet have rarely visited the sites of these, "dangers." Just as the Biological Defense Research Program is accountable, to you and therefore to the public, for its direction and activities, public interest groups should also be accountable for their purpose, standing, and the accuracy of the information they spread.

It is a privilege to respond to a critic who is informed and whose criticisms are based in a knowledge of science and understanding of the threat. It is a sad waste of thousands of dollars in time and effort to continually defend a program that is mandated by Congress, against a handful of people who take no responsibility for their accusations and have no constraints placed upon their oversimplifications and half-truths.

The distribution of misleading information has consequences beyond our borders. In countries where freedom of the press is not a reality, articles on the latest protests over what is too often called the "U.S. biological warfare program" carry an added credibility.

The latest result is an article published in Moscow in which it is alleged that the United States is planning to commit mass murder with Siberian ulcer—that is, anthrax. The author of the article states that he read about this work in a report on a protest by citizens of Amherst against studying anthrax at the University of Massachusetts.

The protests were inspired and sponsored by public interest groups who alleged that the people of Amherst were in imminent danger of infection with anthrax, owing to the DOD research conducted at the university.

Not present in the information these public interest groups presented were some salient facts: the research is conducted with an avirulent strain of *Bacillus anthracis* to improve upon the existing vaccine for anthrax. Research on anthrax has been ongoing at the university without evidence of infection or environmental compromise for the past 23 years, 8 of which were partially funded by the Department of Defense.

The BDRP is conducted solely to enhance our ability to protect and defend the men and women of our armed forces from the acknowledged worldwide threat of biological warfare. Because the program is displayed openly, not all of the attention directed to it is necessarily favorable. There are some who say that the U.S. Biological Defense Research Program encourages an international arms race. We do not believe this is the case.

In accordance with Article X of the Biological Weapons Convention, information and biomedical products developed in the BDRP are shared freely throughout the world and foster mutual beneficial relationships and confidence. Thus, the BDRP can be viewed as discouraging rather than encouraging an international arms race.

If I can have some assistance in putting up the chart showing that vaccine development and weapon development are not parallel. It is unfortunate that Senator Kohl has left because the chart may help him in sorting out differences between offensive and defensive research.

There are some who claim that the distinction between offensive and defensive research is so fine as to be non-existent. If this line of reasoning were true, it would apply equally to all biomedical research that is directed toward a better understanding of human disease.

From the outset, defensive research is based on different postulates and hypotheses than is research directed toward offensive ends, and the rationales for data collection and analysis are different.

At the basic research level, the laboratory techniques used would be very similar, but the objectives are markedly different. Beyond the basic research level, there is a marked divergence in the type of work that would be done.

If a vaccine were to be produced, one would pursue ways of crippling, weakening, or lessening the virulence of the agent in question so that it could be used in humans without fear of inducing disease. In fact, it may be completely inactivated, a killed vaccine.

A vaccine would be produced under the stringent guidelines of the Food and Drug Administration regulations and would have to receive FDA approval before use. This type of work is permitted by the Biological Weapons Convention.

If, however, the goal were to create a weapon, the opposite objectives would be pursued. Efforts to enhance virulence or toxicity and to produce enormous quantities of agent far larger than those required for vaccine production would be undertaken. In addition, the issues of stability, dissemination, and weapons delivery systems would have to be addressed. These activities are clearly prohibited by the Biological Weapons Convention.

There are those who claim that USAMRIID and its scientists are second-rate. This claim is not consistent with the demonstrated performance of these individuals. Both in-house and contract BDRP scientists publish regularly in peer-reviewed scientific journals and are invited as experts routinely to present their work at national and international symposia. Many are officers of international scientific societies and on editorial boards of journals.

The critical element in the performance evaluations of USAMRIID research scientists, as in academic institutions, is publication of senior author and co-authored papers in peer-reviewed journals.

In instances of unusual outbreaks of disease, USAMRIID scientists are consulted routinely by other Government agencies, such as CDC, NIH and the USDA, as well as multiple private organizations and by foreign colleagues in the private and public sectors.

The publication record and scientific accomplishments of our scientists are enviable, and I would welcome the opportunity to expand on this further during the questioning period.

In my written testimony, I have addressed many of the critical issues relating to the proposed transfer of the program to the National Institutes of Health. I believe this is a bad proposal, and would be happy to address this further.

The objective of the medical component of the BDRP is the development of a system of prophylactic and therapeutic measures to protect U.S. military personnel against biological threats. The products primarily are drugs and vaccines.

It is fitting that I call to your attention that on this date, May 17th, in 1749—that is 240 years ago—a baby was born who would radically change our approach to the control of infectious diseases. That baby grew up to be Dr. Edward Jenner, and every one of us is in his debt.

Dr. Jenner developed a new idea. It was called vaccination. Thanks to vaccination, smallpox ceased to be a great plague of mankind, and any number of other diseases have been prevented by immunization processes based on Dr. Jenner's bright idea. We use that same idea to protect against an emerging threat today, the proliferation of biological weapons.

In summary, I would like to state that I have a hectic job trying to stay on top of all the controversy that surrounds this program. But I also have one of the most interesting and exciting jobs in the Army. USAMRIID takes a back seat to no one when it comes to science and accomplishment. We are not just adapting and exploiting new ideas and concepts developed and explored by others. At USAMRIID, science is evolving. It is the others who are adapting and exploiting our findings.

I have been privileged to command that organization for 6 years, and I thank you, Mr. Chairman, for the opportunity to present this testimony this morning.

Chairman GLENN. Thank you, Colonel Huxsoll. We will move along to the other people here and get all the testimony before we have general questioning, but just one comment here on your chart.

As you come out with a parallel path on whichever direction you are going to a vaccine or a weapon, you have some similar things. Then as you start moving up toward the vaccine, you develop an actual vaccine, but don't you have to test it against a virulent form, which would be in the lower level here?

So you are going quite a ways out on both those paths before you know you have a valid vaccine. You have to test it against something of virulent strain, don't you?

Colonel HUXSOLL. No, sir, you really wouldn't. To make the vaccine, you would go right back and test the product that came out of the area where the parallel lines are located.

If you wanted to make a weapon, then you would look at enhancing the virulence. You would look at stabilizing it, ways of dissemination.

Chairman GLENN. But you would be assured of having a valid vaccine without testing it against a virulent strain?

Colonel HUXSOLL. I would not make an attempt to develop a virulent strain to test the vaccine. The strain is virulent in its natural setting. The vaccine is an antigen/antibody reaction. You do not need to do that.

Chairman GLENN. OK. What would be your estimate of the time required to develop a weapon if we wished to do it? The previous testimony was that it would be several years away, 2 to 3 years. Would that be your estimate?

Colonel HUXSOLL. Yes, sir, and I would like to underscore the comment made by Dr. Richardson. We don't do that anyway.

Chairman GLENN. Well, I know, but it was a hypothetical question that was proposed.

Colonel HUXSOLL. I understand.

Chairman GLENN. So I suppose it is a hypothetical answer, also. We are not proposing to break out of the treaty, but I also am concerned about the treaty aspects, to make one further comment.

If we have a treaty we can't verify and we have no similar deterrent capability, then it seems to me we have to think twice before we sign that treaty to begin with, desirable though it may be, geopolitically, at least, to look as though we are against these weapons, which we are.

When we sign a treaty, though, that says that we have no way of verifying it and no deterrent against it, I am a little bit suspicious going in.

The next witness is Dr. Yamamoto, University of California, San Francisco.

Doctor, welcome. We look forward to your testimony.

TESTIMONY OF KEITH R. YAMAMOTO, PH.D., PROFESSOR AND VICE CHAIRMAN, DEPARTMENT OF BIOCHEMISTRY AND BIOPHYSICS, UNIVERSITY OF CALIFORNIA, SAN FRANCISCO, SAN FRANCISCO, CA [1]

Dr. YAMAMOTO. Thank you, Mr. Chairman. I appreciate the opportunity to be here this morning. I would like to make brief comments on three related topics; first, a consideration of biological warfare agents in the context of modern biotechnology; second, a somewhat different view of the goals and activities of the DOD in this arena; and, third, a summary of goals and funding mechanisms of the NIH as they pertain to proposed modifications in the administration of the BDRP.

As we have heard already, since the late 1970s there has been a strong resurgence of BW-related research activities under DOD sponsorship. According to DOD, this renewed interest was stimulated by concern over Soviet efforts to maintain an offensive BW capability, together with the realization that new methods in molecular biology and genetic engineering potentially can be applied to the creation of novel BW agents.

What has been the impact of the new genetic technologies on the overall BW equation? First, biotechnology provides, in principle, the means to produce a vast array of BW agents. Minute changes in the outer surface of a pathogenic virus, for example, could render existing vaccines useless.

Second, the capacity to transfer toxin or disease-causing genes into well-studied and rapidly-dividing bacteria would greatly simplify, in principle, the capacity to store and to scale-up rapidly the production of potential BW agents.

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[1] See p. 485 for Dr. Yamamoto's prepared statement.

Whereas these are two things that biotechnology does for BW, it is equally important to point out something it does not do: biotechnology has had absolutely no effect on the inherent weaknesses of BW agents as efficacious weapons. They remain difficult to target, difficult to control, and slow to act. So, in this sense, biotechnology has had no impact on BW technology.

Finally, it is important to point out that the U.S. scientific establishment is, by a substantial margin, preeminent in biotechnology. U.S. scientists developed recombinant DNA techniques, and they continue to be the prime innovators and practitioners of this technology. I see no evidence for a BW biotech research race, but if there is one, the United States is far ahead in that effort.

Now, how do the BDRP and USAMRIID activities fit into this picture? The mission of USAMRIID is to pursue the pathogenesis, diagnosis, prophylaxis, treatment, and epidemiology of infectious disease and toxins that pose BW threats or are disease hazards endemic in various parts of the world.

The predominant focus, as we have heard from Colonel Huxsoll, is the production of vaccines that neutralize a specific agent or class of agents. The development of vaccines against toxins or pathogens that are endemic to regions occupied by U.S. troops seems clearly justified.

However, practical and conceptual considerations indicate that this strategy cannot succeed as a broad defense against BW, especially in the age of biotechnology; that is, the potential for recombinant DNA methodology to be used for the production of a vast array of novel BW agents renders any vaccine program, in the long run, futile.

It is important to emphasize that vaccines act specifically against only one or a few agents, and that they generate their protective effects slowly over a period of weeks or months after administration. In particular, they are useless if given after the fact.

Nevertheless, DOD programs call for the production and testing of actual BW agents and for the production and stockpiling of millions of doses of vaccines. Who would receive which vaccines? How and when would they be administered? Enemy forces, of course, could readily deploy multiple agents simultaneously or serially.

I conclude that this BDRP strategy is unlikely to protect military personnel against a deliberate attack by BW agents, especially novel, genetically-engineered variants. In turn, this raises questions about the overall justification for the program, and also raises concerns about three related negative consequences.

First, the BDRP exacerbates public health concerns by expanding the scope and scale of development, testing, and risk assessment programs utilizing BW agents. This reflects the problematic history of BW testing programs. Those programs were referred to earlier and I shall not expand further on these here.

The second problem is the destabilization of arms control efforts. To produce vaccines against variant pathogenic viruses, the variant agents must themselves first be produced.

Colonel Huxsoll and others have stated, as we have just heard, that research of this type is not carried out at USAMRIID or elsewhere within BDRP. However, in analyzing hundreds of technical working unit summaries from DOD, Charles Piller and I, in preparing the book "Gene Wars," uncovered numerous projects that involved manipulation of the antigenicity and pathogenicity of biological agents, and involved the development of delivery systems for such agents.

One study stated that it is "the goal to modify enteric bacteria"—these are bacteria that grow in the human gut—"genetically to produce any desired antigenic structure and level of pathogenicity."

Another study modified the botulism neurotoxin such that toxicity was conserved while antigenicity was destroyed. This means that the research yielded a form of botulism that would be unaffected by conventional vaccines.

Especially because the United States is the acknowledged world leader in biotechnology and biomedical research, the BDRP strategy is destabilizing to arms control efforts. When others see what we are doing, they are compelled to develop parallel programs.

A third problem relates to the utilization of fiscal and intellectual resources. How good is BDRP research. We can look at this in two ways. One is the funding/oversight mechanism and the other is productivity.

DOD research is carried out almost exclusively under contracts in which researchers are invited to submit proposals that satisfy narrowly-defined programmatic goals. In general, targeted research programs of this type tend to discourage participation from the most innovative researchers.

Moreover, the scientific review of those applications is advisory only. This means that the DOD can and does fund programs that receive negative scientific evaluations if it is perceived that the projects are of sufficient military importance.

And many of the reviewers themselves appear poorly qualified. For example, a panel of 11 scientists charged with judging molecular biology proposals for the Army in 1987 included only one molecular biologist. The result is work that too often is conceptually weak, of questionable significance, or seems extravagantly supported.

Many of the investigators were found to have weak publication records, and their work to be descriptive rather than innovative. Even at USAMRIID, which is the primary research site for the Medical Defense Program, productivity, as assessed by funding level relative to published findings, is modest.

For example, in fiscal 1987, USAMRIID received $19.8 million to support seven large research projects, which themselves were divided into 33 sub-projects. Three of the large projects received $8.2 million and resulted in 28 publications. Eleven of the 33 subprojects, one-third of the total sub-projects, yielded no publications.

For comparison, researchers in my department at the University of California in San Francisco received about $7 million in Federal support during that same time and published 165 papers.

More important than these raw numbers, of course, is the quality of the research, and my major concern is that the funding policies of BDRP result in studies that fall substantially short of top quality.

Now, all of this being said, the broad objectives of BDRP are not without merit. According to DOD, they are essential for maintaining security of the U.S. armed forces. Moreover, many of the diseases and infectious agents investigated within BDRP are major scourges, especially within the underdeveloped world.

How might the objectives of BDRP better be achieved? Here, it is useful to consider NIH-supported research, in particular that of 2 of its 13 research institutes whose mission statements coincide most closely with those of the BDRP and USAMRIID.

The National Institute of Allergy and Infectious Diseases (NIAID) conducts and supports research to study the causes of allergic, immunologic, and infectious diseases, and to develop better means of preventing, diagnosing, and treating illness. The National Institute of Environmental Health Sciences (NIEHS) investigates the effects of chemical, physical, and biological agents on human health.

NIH funding programs have produced the most broad-ranging, creative, and dynamic biomedical research enterprise in the world. In the last 40 years, the Nobel Prize in physiology or medicine has been won or shared by 52 scientists holding NIH support, a remarkable record of dominance.

NIH-funded research has cured disease, developed new drugs and patient treatment methodologies, and generated the observations that spawned the biotechnology industry.

What is responsible for such a consistent pattern of success? In my view, there are two major programmatic features. One is an open grant system in which individual investigators initiate their own proposals rather than responding to contract offerings. This encourages freedom of inquiry and novel interpretations of unexpected results.

Secondly, a rigorous review process is used to evaluate NIH applications. Every grant is subject to two levels of review. An initial review group or study section composed of 15 to 20 eminent scientists in a given subject area first evaluates the applications solely on the basis of scientific merit. The study section assigns a numerical priority and passes its findings to a national advisory council representing a particular research institute.

Councils are comprised of 15 to 20 individuals including, not only scientists, but also lay representatives with demonstrated interest in the program areas of the institute. The council makes funding recommendations based on considerations of scientific merit, as well as on relevance of the proposed studies to the programmatic goals of the institute.

Why should the United States support two research-funding enterprises with such similar overall objectives? The NIH has clearly devised an outstanding mechanism for stimulating and supporting outstanding biomedical research. It is also free of other potential problems inherent within the BDRP, such as destabilization of arms control.

I submit that the BDRP could carry out studies of higher overall quality, accomplishing the same goals without the inherent complications, if the funding and review processes were administered by the NIH.

According to such a plan, funds for the medical defense and related portions of BDRP would be transferred into the NIH budget, perhaps into NIAID and NIEHS, thereby becoming subject to its review and oversight policies. The bills just submitted by Representative Owens speak to these issues directly.

The dual review system at NIH offers the opportunity to assess projects for scientific merit alone and to make subsequent policy decisions concerning programmatic areas to be supported. This would ensure that the goals of the BDRP would be considered and accommodated.

In fact, I would like to emphasize that the Assistant Secretary of Defense for Health Affairs is already chartered as an ex officio member of both the NIAID and the NIEHS councils.

High-quality research pursued vigorously and intelligently and reported openly could reap enormous public health benefits, especially within the Third World. At the same time, the broad dissemination of this information would undermine the utility of these agents for BW purposes.

If these actions could be coupled with increased efforts to strengthen present sanctions against biological weapons, citizens of the world might be both safer and healthier.

Chairman GLENN. Thank you very much, doctor.

Dr. Matthew Meselson, Harvard University.

TESTIMONY OF MATTHEW MESELSON, PH.D., PROFESSOR OF BIOCHEMISTRY AND MOLECULAR BIOLOGY, HARVARD UNIVERSITY, CAMBRIDGE, MA

Dr. MESELSON. Thank you, Senator Glenn. I have brought with me a final copy of my testimony. I request that it be the one inserted into the record, if that is possible.[1]

Chairman GLENN. Fine. It will be substituted and be included in the record in its entirety.

Dr. MESELSON. I appreciate the opportunity to appear before this Committee to take part in its continuing consideration of biological and toxin weapons. In addressing the questions you have posed for today's hearing, I believe it is important to understand the reasoning that went into the longstanding United States renunciation of these weapons.

Twenty years ago, after intensive inter-agency review, the United States unilaterally and unconditionally renounced the development and possession of biological and toxin weapons. Our considerable stockpiles of such weapons were destroyed and the facilities for developing and producing them were converted to other uses.

These U.S. decisions went far beyond the mere cancellation of a program. They renounced without prior conditions even the option to develop or acquire biological and toxin weapons. Why?

First, it was understood at that time that biological weapons could be as great a threat to large populations as nuclear weapons, and that no reliable defense is likely. Already having nuclear weapons, the United States has no need for an additional, less predictable, less targetable strategic systems ineffective against hardened military installations.

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[1] See p. 498.

Second, it was evident that biological weapons could be much simpler and less expensive than nuclear weapons to develop and produce. Proliferation of biological weapons would greatly increase the number of nations to which the populations of the United States and its allies are hostage.

Third, it was realized that our biological weapons program was pioneering an easily duplicated technology, and that our program was likely to inspire others to follow suit.

This stark analysis led to the conclusion that our biological weapons program was a substantial threat to our own security. The policy implication was that we should convincingly renounce biological weapons and seek to strengthen international barriers to their proliferation. In implementing this overall policy, the United States subsequently sponsored the Biological and Toxin Weapons Convention of 1972, ratified it in 1975, and led efforts to enhance the limited verification provisions of the Convention at its second review conference in 1987.

Today, to the best of my knowledge, no nation possesses a stockpile of biological or toxin weapons. Nevertheless, there is justifiable concern that the recent proliferation and use of chemical weapons, particularly in the Middle East, may set the stage for attempts to develop and produce biological weapons.

The potential linkage between chemical and biological weapons is one of the factors that argues for pressing forward with our commitment to achieve a verifiable international ban on chemical weapons. This treaty, the Chemical Weapons Convention, is now in an advanced phase of negotiation by the 40-nation Committee on Disarmament in Geneva.

The present rolling text of the Convention is largely based on the United States draft treaty presented in Geneva by then Vice President Bush. At the time, the Soviets, and even some of our allies, were unwilling to accept the tough verification measures called for in the United States draft. But with the changing attitude of the Soviet Union toward on-site verification, the United States position won out.

It is time to give high priority to settling the remaining issues at Geneva, to resolve the outstanding bilateral issues with the USSR, and to conduct needed studies in the United States on verification techniques.

Our first and most important line of defense against biological and toxin weapons is the effort to prevent their introduction into the arsenals of the world. We do this through our own example, through a growing and increasingly intrusive system of arms control agreements, and by a variety of diplomatic activities backed up by the influence and prestige of the United States.

In addition to these efforts to prevent the proliferation of biological and toxin weapons, there is the possibility of providing a limited defense against them. President Nixon, in 1969, did not reject biological research for protective purposes. Instead, he announced that, "We shall restrict our biological program to research for defensive purposes strictly defined, such as techniques of immunization, safety measures, and the control and prevention of disease."

This careful statement remains a good definition to guide United States military biological research programs. It subordinates biological research to the fundamental U.S. policy of renouncing biological weapons and building constraints against their proliferation. Moreover, it recognizes the requirement that our renunciation be convincing to others.

I recall that shortly after President Nixon's decisions, the White House sent inquiries to a considerable number of scientists and others who had been involved in the United States biological weapons program, a total of nearly 100.

The White House inquiry asked if the United States biological research program could be conducted without secrecy. The great majority of respondents replied that secrecy was not needed.

Openness in all biological research has advantages that far outweigh any risk. It makes U.S. policy credible. It helps in recruiting and keeping the most talented investigators and in exposing shoddy work or misguided lines of research. Openness accelerates progress through the kind of scientific interchange characteristic of the health sciences.

Finally, by minimizing mutual suspicions, openness makes it possible for more nations to coordinate their efforts to combat disease and to guard against infringements of the prohibition of biological and toxin weapons.

I believe that there are areas of biological research in which the military should be engaged. These must be judged on a case-by-case basis. Military research should be done with the same high degree of openness that characterizes other research in medicine and public health.

There should be meaningful civilian involvement in the oversight of the entire program, although it must also be recognized that the military do have special needs for protection against infectious hazards that the civilian sector tends to ignore.

Organized and directed properly, USAMRIID and other military facilities can increasingly be used to enhance confidence in biological disarmament and to help overcome the very real threat to the military and to all mankind from naturally-occurring disease.

I would like to make some comments on matters touched upon by previous witnesses. Sometimes it is said that there is no ability to verify the Biological Weapons Convention. That, of course, is an overstatement. There is an ability to verify the Biological Weapons Convention.

The Convention itself has very limited verification provisions. There are, however, national intelligence means of verifying compliance. There is also a considerable amount of information flowing to us daily from all kinds of non-governmental sources, including the international press. This has not been regarded, justifiably, as enough.

There have, in recent years, been measures taken to enhance the verification provisions of the Biological Weapons Convention. These have not taken the form of amendments of the treaty, but rather the form of agreements reached either at the review conferences of the Biological Weapons Convention or at the United Nations.

Today, the Secretary General of the United Nations has the authority to send teams to investigate on-site claims of chemical or biological attack, something he did not have the authority to do until recently.

Moreover, at the second review conference of the Biological Weapons Convertion in 1987, an agreement was reached that annual declarations would be made of containment facilities at the highest level—that is, BL-4 containment facilities—regardless of their use by all nations party to the Biological Weapons Convention, and of lower-level containment facilities, BL-3, if they are in facilities that specialize in biological defense work.

One of the facilities declared by the Soviet Union which was declared even though, strictly, it was not required to be declared under the agreements reached by the second review conference, is located in Sverdlovsk. This brings me to some brief comments I wish to make on the issue of the anthrax outbreak in Sverdlovsk that occurred in April and May 1979.

The burden of the evidence available is that the anthrax outbreak was the result of a failure to keep anthrax-infected animals off of the civilian meat market, as the Soviets have maintained, and not the result of an explosion at a biological weapons factory, as previously asserted by the United States.

I think Ambassador Holmes' statement that maybe we will never know the cause of that epidemic shows a commendable willingness to review previous conclusions in the light of new information and new interpretations.

Ambassador Holmes correctly shifted the focus to the question of the facility in Sverdlovsk. There is indeed a large facility consisting of several buildings that can be seen on unclassified satellite photographs obtained, for example, from the Spot Corporation, the French satellite corporation, which has a security fence around it and is exactly at the place that the Soviets have declared they have a facility for defensive biological studies. They have said in their declaration that there are no pathogens at the facility.

The next step, it seems to me, in clarifying this issue, is to visit that facility, and I hope that is underway in discussions between the United States and the Soviet Union. That would be the kind of openess that is needed.

This leads me to my final point, and that is that the barriers to the spread of biological weapons are not financial and they are not technical. They are psychological and political. That means there is no technical fix. It means that we need the coordination and cooperation of other countries.

The United States cannot, by itself, prevent the state of mind from coming into being somewhere in the world that would produce, or develop and then produce biological weapons. Without the cooperation of other countries, our policy cannot be effective.

The foreign country whose cooperation is most essential is the Soviet Union. That is why it is essential for us to go the limit in trying to resolve the issues that have come up between the United States and the Soviet Union in the area of biological and chemical weapons.

This will require greater Soviet willingness, for example, to let us go see the Sverdlovsk facility to establish what is there today—and maybe shed some light on what was going on there 10 years ago. It will also require U.S. willingness to objectively review previous allegations in view of new information and analysis.

Thank you, Mr. Chairman.

Chairman **Glenn**. Thank you very much, Doctor.

Dr. Jonathan King, of MIT.

TESTIMONY OF JONATHAN KING, PH.D., PROFESSOR OF MOLECULAR BIOLOGY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MA

Dr. **King**. Mr. Chairman, members of the Committee, and staff, I have followed and appreciated the important work done by many members of this Committee with respect to the C and BW issues and I am pleased to be given this opportunity to speak to you today.

I hope, also, that my written comments can go in the record [1] and I will try to abbreviate them.

Chairman **Glenn**. Your entire statement will be included.

Dr. **King**. I currently chair the Committee on the Military Use of Biomedical Research of the Council for Responsible Genetics. The CRG is a national organization of scientists, environmentalists, public officials, and citizens working to ensure the productive development of biotechnology in a socially useful manner.

The Committee on the Military Use of Biomedical Research has been closely monitoring developments related to the Biological Weapons Convention and biological weapons issues for the last 5 years.

As a result of the fundamental self-reproducing character of living creatures, they always have the potential to spread through populations and ecosystems—a feature of virus infections so tragically familiar to us at present.

Thus, though always a hazard to human populations, they have never been effective weapons, agents whose targets could be tightly controlled. It is particularly important to recognize that infectious agents recognize neither national boundaries nor uniforms, whether the Black Plague in the 14th century or AIDS in the 20th century.

It is not at all clear, at least to me, that it will be possible, using biotechnology, to generate infectious agents that have the character of weapons, agents that will, in a controlled manner, cause damage to enemies and not to friends.

However, I have no doubt that research efforts in this area will generate as side products organisms deleterious to the health and welfare of human, plant, and animal populations. Therefore, the danger is not the development of biological weapons. The danger is the proliferation of biological weapons defense programs themselves. And, of course, all nations call their programs defense programs because of the treaty.

Let us consider an adversary. Any plan for offensive use begins with the ability to defend one's own troops or population, as in the development of a vaccine against a virus.

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[1] See p. 506.

Historically, vaccines were made from inactivated viruses so that preparation of the vaccines required growth of the virus in substantial quantities. However, with advances in biotechnology, it is in many cases possible to develop vaccines using only parts of the virus.

However, with respect to your question earlier, sooner or later the vaccine must be tested, and this means infecting animals or humans with the actual virulent form of the agent that you believe will be deployed. Testing of vaccine against the test agent does not constitute a measure of actual efficacy. You have to test against what you believe to be the actual infectious form.

Thus, intrinsic to any program is the gathering of data on the infectious properties of the weapons agent, the dosage required, the time course of the infection, its severity or degree of debilitation. Without such information, it is impossible to evaluate the efficacy of the vaccine, and therefore to carry out the primary mission.

No matter how vigorously one proclaims or believes in the defensive intent, an informed observer knows that the data and technical capacity needed for the offensive side is always present.

Similarly, consider an aerosol test facility. To determine whether some inactivation process is effective, one generates actual aerosols to mimic a projected military scenario. As a result of this, the technology for generating aerosols is, of course, developed.

The work with the aerosols then yields critical data. How long does the agent survive? What size droplets are optimal? What processes are they resistant or sensitive to? Again, a neutral observer will recognize immediately the potential offensive value of such pilot work.

This inability to separate the offensive from the defensive capacity is not due to a flaw in the design of the BDRP program. It is an intrinsic aspect of such work with infectious organisms. Because of their ambiguous character, BDRP programs are provocative with respect to other nations and destabilizing with respect to the treaty regime.

I am certain that the Department of Defense and the Department of State would not look favorably on the establishment of an aerosol test facility of the scale of the Dugway facility in Cuba, Nicaragua, Angola, or the Soviet Union.

The direct consequence of our program can only be proliferation of such efforts by other nations around the globe, as some nations respond to the perceived threat of the U.S. program.

However, even without this bi-modality, even without concern about the U.S. threat, the impetus for proliferation is equally great. After all, if these are really only defensive programs, as has been described in the previous testimony before this Committee, and potentially efficacious against threat, why shouldn't other nations have them?

Why shouldn't Pakistan have a program to defend themselves against the perceived threat from India? Why shouldn't Syria, who I believe has not ratified the treaty, have such a program with respect to the potential threat from Israel—or Iran and Iraq, Greece and Turkey, East Germany and West Germany?

Consider the consequences. In each case, the mission of the military or the group involved in each nation will be to try to figure out beforehand what sort of novel pathogens the adversary may want to develop, then to establish research programs on generating such novel pathogens so as to be able to prepare defenses. These are not offensive programs; these are honest defensive programs with respect to historical enemies and not to the United States.

The worldwide proliferation of such research efforts will almost certainly yield as products or as side products, as failures of the program, the development of variant, novel or prophylaxis-resistant pathogens of plants, animals or humans.

We have enough problems trying to deal with scourges such as AIDS without catalyzing the growth around the world of efforts designed to generate novel pathogens. Such a development would be a human tragedy of historic proportions. Proliferation of BDRP programs around the world, spurred by the U.S. program, constitutes a far more serious threat to national security than any actual weapons program.

Turning to the question of terrorism, which was one of the questions in your original charge; given the complexities of living organisms and the current state of knowledge, a program whose goal is to develop biological warfare agents is a major research project.

Such agents would have many stringent requirements, as Colonel Huxsoll has shown, in terms of infectivity, survivability, transmissibility, storage properties, resistance to prophylaxis.

Such a program requires many, many years of work by a relatively large group of highly trained scientists who would have to have access to modern technology in genetic engineering, instrumentation, enzymes, reagents, high-powered computers, et cetera.

In my estimation, there is no possibility that such a program could be carried out by a terrorist grouping, and if it was launched, it could not be hidden. However, the danger from terrorists is not the development of biological weapons themselves, but rather a raid on an existing BDRP facility where considerable expertise has been developed.

Therefore, protection from terrorism again lies not in the technical direction of biological defenses, but in strengthening the treaty regime and prohibiting the establishment of biological research for military purposes.

Where does national security lie in the long run? The Council for Responsible Genetics supports the ratification of Article IV, as described earlier; supports the transfer of the funds to the NIH. But more important in the long run, is following the lead of President Nixon.

One, terminate the BDRP and the Dugway test program on infectious agents; transfer the funding for medically or technically useful aspects of the program to civilian agencies to carry forward the scientifically useful aspects of the project.

Secondly, launch a diplomatic offensive publicizing the Biological Weapons Convention domestically and internationally. One rarely hears of this treaty from our own Government agencies. In fact, this morning all three representatives of the administration who testified made no mention of the fact that there are nations in the world who have not ratified the treaty. They said nothing about efforts to call the world's attention to these nations and put pressure on them.

The current issue of Biotechnology Magazine, which is a widely circulated journal in the biotechnology industry, carries a DOD-sponsored report discussing military aspects of biotechnology. It makes no mention of the existence of such a treaty.

The administration should send Arms Control and Disarmament Agency personnel to international scientific meetings—the Microbiology Congress, the Biochemistry Congress—and announce that the United States has an aggressive program of strengthening the treaty, and verification procedures; take advantage of the upcoming 1991 review of the BWC, as Professor Meselson has pointed out, to strengthen it and institute levels of verification provisions required; develop a policy of economic and political sanctions against any nation or group found to be violating the treaty. Obviously, associated with that is a push for full inspection, full openness, et cetera.

In closing, we believe that every dollar spent on promoting and strengthening the treaty and on a diplomatic offensive for the peaceful use of biotechnology will buy orders of magnitude more national security for the American population than dollars spent on the BDRP program.

Our Nation has been the world leader in the historic breakthroughs in genetic engineering and biotechnology. We are now seeing the onset of a dangerous and tragic turn toward militarizing this technology. We should turn away from this course and become the world leader in its peaceful development. The Congress can take the lead in this initiative.

Thank you.

Chairman GLENN. Thank you.

Dr. Sidel.

TESTIMONY OF VICTOR W. SIDEL, M.D., DISTINGUISHED UNIVERSITY PROFESSOR OF MEDICINE, MONTEFIORE MEDICAL CENTER/ALBERT EINSTEIN COLLEGE OF MEDICINE, BRONX, NY[1]

Dr. SIDEL. Thank you very much, Senator Glenn. I will be very brief because it has been a long morning for you. I want to start out by saying how grateful I am to you and to your staff for the extraordinary preparation for this session and for the recent session at which I had the privilege of testifying before you on chemical weapons.

Chairman GLENN. Thank you.

Dr. SIDEL. The material in my written testimony will appear in the record and I will not read it. I just want to call attention to the specific analysis of the research being done in Amherst, which Colonel Huxsoll referred to, that is included in it. I hope you and your staff will look over the circumstances of what is happening at the University of Massachusetts at Amherst very carefully.

The reason I am sitting at this table is that I am the Chairman of the Working Group on Chemical and Biological Weapons sponsored by the Physicians for Human Rights and the Physicians for Social Responsibility.

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[1] See p. 512 for Dr. Sidel's prepared statement.

Why are physicians working on this problem? Why am I here? Some years ago in THE LANCET, the British medical journal that is one of the most prestigious in the world, the editor wrote, "A nation's lawyers must execute its laws even when this means the execution of a human being. A nation's soldiers must kill whomsoever their leader commands. But the doctor is excused such destruction. Even in war, a physician may be permitted to believe in human brotherhood, to treat all people without political or racial or religious distinction."

In short, Senator Glenn, physicians have some special rights to offer. For example, last night Physicians for Human Rights sent a delegation to Tbilisi, at the invitation of Academician Andre Sakharov and Dr. Elena Bonner, his wife, a physician, specifically to look into the use of chemical agents in Tbilisi.

Physicians for Social Responsibility, as you know, has as its primary concern the issue of nuclear weapons. We are concerned that the lowering of the barriers to chemical and biological weapons may open the door to the use of nuclear weapons.

Physicians for Social Responsibility rates into this in another way. We continue to quote Albert Einstein, who said that with the development of nuclear weapons everything has changed except the ability of human beings to understand that change and thus we drift toward "unparalleled catastrophes." I would suggest, Senator Glenn, that this potential for catastrophe is present for chemical and especially biological weapons as well.

The main concern of Physicians for Human Rights is that civilians, particularly the very young, the sick and the old are especially vulnerable to chemical and biological weapons; such weapons therefore have the potential for particular destructiveness to human rights.

In your own comments you point out eloquently why there can be no military justification for the use of biological weapons. You state, quoting the National Security Council, "All existing biological weapons agents are slow-acting, unreliable, indiscriminate, unpredictable, and capable of backfiring on the attacker."

Yet in several other points in your comments today, you talk about retaliation or the threat of retaliation as a possible deterrent for biological weapons. If these weapons are all the things you say they are, and I believe they are, it is utter nonsense for a nation to say that it would ever want to use these weapons in retaliation.

Therefore, what is needed is the strengthening of the Biological Weapons Convention with appropriate kinds of verification mechanisms so that they will be the bulwark against the use of such weapons.

Reliance on the Convention means that the United States must do nothing that would increase the threat of breaching its controls. As I say in my testimony, that means that the BDRP must be stripped of its medical research authority, and that any medical research on biological weapons be performed by the NIH.

Reliance on the Convention means also that the bill that you and your colleagues just have introduced is an extremely important one. It means that the bills that Congressman Owens has introduced are extremely important. We support all of them.

In short, Senator Glenn, may we compliment you on the work that you and your staff have been doing. May we urge you to take this opportunity to urge the Congress to think in new ways about biological and chemical weapons and to help to wipe them off the face of the earth.

Chairman GLENN. Well, I wish we had some magic wand we could wave and do exactly that, obviously. I wish we had perfect verification. The question is whether we sign treaties without a verification capability, as was done in this particular situation.

I agree with you that we should be working to strengthen verification. If it gets good enough, then we don't need anything else. In the nuclear field and other fields, we have felt that we needed a counter-capability, lacking a perfect verification regime, and that was the reason I brought that up the way I did.

Our time is very short. I have some other commitments I cannot avoid here at noon. I will try and run very rapidly through a few questions here and would ask that you respond as briefly as you can.

Colonel Huxsoll, in discussion with the Committee staff, you said there is no organizational sensor to determine whether the United States is being attacked. I agree with that. You said that man is the detector. I suppose people start dying.

But this contrasts with a statement by David Kingsbury, who is former Director of the Naval Biosciences Lab, who claimed that his lab and USAMRIID are charged with the awesome task of coming up with a definitive statement that we have been attacked with a biological weapon.

Which statement is true? How do we tell if we are being attacked? How do we define it, just when people start dropping?

Colonel HUXSOLL. At present, there is no detector. There is no box out there that will act as an alarm where a bell will ring or a light will flash. That is being pursued at the CRDEC at Edgewood, and hopefully it will meet with success.

My comment about man being the detector is right on target, sir. We have no sensor, and the first indication is probably military personnel becoming ill.

Chairman GLENN. Who is charged in the military chain of command with the authority to designate a biological organism as one of military significance? Does the Secretary of Defense make that determination?

Colonel HUXSOLL. That comes initially out of the intelligence community, sir.

Chairman GLENN. Okay, so they will——

Colonel HUXSOLL. It is up to them.

Chairman GLENN. Do they have the authority to designate a particular biological organism as one that has military significance?

Colonel HUXSOLL. There are lots of different microorganisms, toxins, and so forth, but it is not an endless list that would meet the criteria for a potential biological weapon if one were going to seek such a weapon. That has to be coupled with intelligence information that would suggest that someone is indeed pursuing the development of one of those agents that fit in that category.

Chairman GLENN. How do we know when to use vaccines?

Colonel HUXSOLL. The policy has not yet been completely established, but we are stockpiling vaccines. And we recognize the fact that the best place for a vaccine is probably in somebody's arm, but the list gets quite long and the military people responsible for training already have a difficult time with all the vaccinations that these people have to get. To add still more would enhance that problem.

If the threat should rise in a given geographic area—take an example of an escort ship in the Persian Gulf when we were doing that. If one of those crews were attacked or the ship were attacked, let us say, with tularemia, then we would probably pull out the vaccine and vaccinate the crews on the escort ships.

Chairman GLENN. Okay. There are a lot of other questions, but we are going to have to move along.

Dr. Yamamoto, why do you feel that the development of vaccines against pathogens or toxins cannot succeed as a broad defense against biological weapons?

Dr. YAMAMOTO. Vaccines are specifically targeted—what gives a vaccine its power is that it is very specific in its action. It selects one agent or a class of agents against which to work.

It also takes a long time for the immune response to develop. It takes a long time for the body to build up the capacity to ward off an infectious agent. So, as Colonel Huxsoll pointed out, even if a conventional agent were used in an attack, the first round, would be, as you point out, the indication of people beginning to drop.

In an interview that we held with Dr. Huxsoll in 1986, he suggested that "You might have a situation where a given unit is exposed and the reaction might be, well, they got us once, but we are going to protect ourselves and they are not going to get us again." This obviously does not recognize the possibility that the second round might be an attack with an entirely different agent.

Immune responses are complicated. They place a large challenge on the body itself and can actually backfire, and we have seen examples of that with various kinds of vaccines that have been widely disseminated in this country among the public.

So I think that, coupled with the capability of making variant agents, it is not possible that the vaccine program in the long run can work.

Chairman GLENN. Dr. King, you suggest transferring the funding for medically or technically useful aspects of the Biological Defense Research Program to civilian agencies to carry forward the scientifically useful aspects of the project.

Are you saying that the Federal Government should do no research even in terms of defense?

Dr. KING. I actually think that the best defense against biological weapons is the treaty. That is the front line of the defense. That is the thing that is most important that you secure.

Chairman GLENN. Well, I agree, but let us say the treaty is violated.

Dr. KING. Okay. What is the second line of defense? The second line of defense is almost certainly the general level of public health of the population. Most of the epidemic-type scourges around the world occur in Third World countries where populations are weak. They don't have adequate sanitation systems, and as a result have cholera. In a population that is healthy with high sanitation, mortality from disease is much, much, much lower.

So the second line of defense is to have a vigorous public health effort. I personally think that there is a kind of biasing of this discussion because the program we are talking about is the defense of military personnel. But if you look in the older discussion, on the use of biological agents, use against civilian populations to demoralize them is referred to, because that is the population that can't be defended.

So the defense of the general civilian population doesn't come from a BDRP program. It comes from a vigorous civilian general public health program and knowledge about health and disease.

One last clarification. I want to remind people that vaccines do not directly inactivate the challenge agents. What a vaccine does is activate the body's defenses. If you are exposed to tularemia today and you are vaccinated tomorrow, you still come down with acute tularemia. It takes months for the body to build up its immunological defenses. It is not an instantaneous solution.

In addition no one has mentioned plants and, of course, we have no means at the present time of protecting plants from disease. If you consider the corn crop of the United States, which is a genetically rather uniform population, it can't be defended by military means from an adversary. If you have a vigorous economy, then you can survive loss of the corn crop.

Chairman GLENN. Dr. Sidel, you had some thoughts on that. In what way do you think turning over the defensive biological research program to civilian agencies will reduce the chance that our research will be perceived as offensive?

Dr. SIDEL. When you perform such research within a military program, the suspicion immediately arises--the same questions that arose when you looked at the BDRP chart, Senator—whether the vaccine or other defenses are being produced so they can be used for our troops before we initiate a first use of biological weapons.

If civilian health agencies work on these modalities of protection and release them freely and openly to the whole world, then these will be seen as public health measures and not as military measures that may contravene the Convention.

Chairman GLENN. Dr. Meselson, do you agree with Ambassador Holmes' statement a while ago—I believe you were in the room when he gave his testimony—do you agree with his statement that the anthrax outbreak at Sverdlovsk and the yellow rain episode in Southeast Asia were violations of the 1972 Biological Weapons Convention?

Dr. MESELSON. I didn't understand him to say that, Senator, but I definitely do not agree that that can be said, no.

In the case of the Sverdlovsk anthrax outbreak, at one end you might have people who say we will never know what caused it. I am more optimistic. On the basis of the evidence available to me I believe that it was a natural outbreak.

There is a facility in the city of Sverdlovsk. We need to know what it is. The Soviets have told us its exact location. The next step is to go look at it.

Chairman GLENN. Have such requests been made?

Dr. **Meselson**. I don't know. Maybe we could talk about that separately.

Chairman **Glenn**. Fine.

Dr. **Meselson**. But just to continue on the anthrax, I would be glad to submit for the record my summary of the situation with regard to that outbreak.[1]

Chairman **Glenn**. Fine. We would request that that be done, please.

Dr. **Meselson**. As for the yellow rain allegation, I believe that was a mistake. I have looked into it a great deal. The U.S. allegation needs objective review. There was massive withholding by the U.S. Government of negative evidence, so it was more than a mistake, and it was wrong.

The essential thing is to get into communication with the Soviets about these things, to try to persuade them to take—they have taken some steps towards openness—and, on the other hand, to get agreement on our side that we will take a fresh, objective look at these questions.

Chairman **Glenn**. Thank you very much. Gentlemen, I was going to finish off with a question that probably would have given us another 2 hours here today, and that was do any of you have comments on the testimony or answers of the others on the panel. [Laughter.]

Now, I will not be able to do that because I am very, very late for another meeting in which I am one of the participants. I am not going to be able to do that, but I would seriously invite your comments for our record on responses to what each of the other witnesses have said.

Several of you have disagreed with Colonel Huxsoll, obviously, and several of you have had variations of opinion with each other here, which is not at all unusual in the scientific community, certainly. I would solicit your comments and we will include those in the record with those of the others. I am sorry that we cannot go on for another 2 hours because that might be the best exchange of all.

But I am going to have to end, and I appreciate very much your being here this morning. We have dozens of more questions that the able staff did prepare for me, Dr. Sidel, and we will want to select some of those I was not able to ask and get those to you for a reply. We would appreciate your response.

We appreciate your being here. Thank you very much.

The hearing will stand in recess subject to the call of the Chair.

[Whereupon, at 12:24 p.m., the Committee and Subcommittee were adjourned.]

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[1] See p. 523.

APPENDIX

MR. DAVID GOLDBERG

FOREIGN SCIENCE AND TECHNOLOGY CENTER,
U.S. ARMY INTELLIGENCE AGENCY
TESTIMONY BEFORE THE SENATE GOVERNMENTAL
AFFAIRS COMMITTEE AND THE SENATE PERMANENT
SUBCOMMITTEE ON INVESTIGATIONS - FEBRUARY 9, 1989

GOOD MORNING SENATOR GLENN AND SENATOR NUNN AND MEMBERS OF THE GOVERNMENTAL AFFAIRS COMMITTEE AND MEMBERS OF THE PERMANENT SUBCOMMITTEE ON INVESTIGATIONS. THANK YOU FOR THE OPPORTUNITY TO APPEAR BEFORE YOU TO TESTIFY ON THE SUBJECT OF CHEMICAL WARFARE. FIRST I WILL PRESENT SOME BASIC INFORMATION TO INCLUDE DESCRIPTIONS OF THE MORE COMMON CHEMICAL WARFARE AGENTS AND THEIR EFFECTS ON HUMANS. I WILL THEN PROVIDE A BRIEF HISTORY OF THE USES OF CHEMICAL AGENTS IN WAR.

THE UNITED STATES DEPARTMENT OF DEFENSE DEFINES A CHEMICAL WARFARE AGENT AS, "A CHEMICAL SUBSTANCE WHICH IS INTENDED FOR USE IN MILITARY OPERATIONS TO KILL, SERIOUSLY INJURE, OR INCAPACITATE MAN THROUGH ITS PHYSIOLOGICAL EFFECTS. EXCLUDED FROM CONSIDERATION ARE RIOT CONTROL AGENTS, HERBICIDES, SMOKE, AND FLAME." CHEMICAL WARFARE AGENTS, OR CW AGENTS, CAN BE CATEGORIZED ACCORDING TO THEIR PHYSIOLOGICAL ACTION. AGENTS HAVE BEEN GIVEN DIFFERENT KINDS OF NAMES; SOME ARE REFERRED TO BY THEIR ACTUAL CHEMICAL NAMES WHILE OTHERS ARE GIVEN A NAME HAVING NO RELATION TO CHEMISTRY. MANY AGENTS HAVE BEEN ASSIGNED ONE OR TWO LETTER CODES SUCH AS THOSE USED BY THE UNITED STATES.

BLISTER, OR VESICANT AGENTS, DAMAGE CELLS OF THE SKIN AND MUCOUS MEMBRANES. THIS LEADS TO BURNS AND BLISTERS OF THE SKIN, DAMAGE TO THE UPPER RESPIRATORY TRACT AND LUNGS, AND DAMAGE TO THE EYES. BLISTER AGENTS ARE GENERALLY THOUGHT TO BE DELAYED ACTION CASUALTY PRODUCING AGENTS, SUCH AS THE VARIOUS MUSTARD AGENTS, BUT OTHERS CAN BE MORE RAPID ACTING. EXPOSURE TO ENOUGH AGENT CAN LEAD TO DEATH DUE TO RESPIRATORY COMPLICATIONS OR INFECTION. EXAMPLES ARE SULFUR MUSTARD, THE NITROGEN MUSTARDS, LEWISITE, AND PHOSGENE OXIME.

CHOKING AGENTS IRRITATE THE RESPIRATORY TRACT AND EYES. HIGH CONCENTRATIONS OF CHOKING AGENTS CAN CAUSE SEVERE DAMAGE OF LUNG TISSUE WHICH LEADS TO PULMONARY EDEMA, ACCUMULATION OF FLUID IN THE LUNGS, AND EVENTUALLY DEATH DUE TO A LACK OF OXYGEN. THESE AGENTS RANGE FROM IMMEDIATE TO DELAYED ACTION. PHOSGENE IS AN EXAMPLE OF THESE AGENTS.

BLOOD AGENTS AFFECT BODY FUNCTIONS BY INTERFERING WITH THE UTILIZATION OF OXYGEN AT THE CELLULAR LEVEL WHICH LEADS TO DAMAGE TO BODY TISSUES AND DEATH. BLOOD AGENTS ARE RAPID ACTING. EXAMPLES ARE CYANOGEN CHLORIDE, WHICH ALSO IRRITATES THE LUNGS AND EYES, AND HYDROGEN CYANIDE.

NERVE AGENTS CAUSE THE IMPROPER TRANSMISSION OF NERVE IMPULSES BY INHIBITING THE NEURAL ENZYME ACETYLCHOLINESTERASE. THIS RESULTS IN DIFFICULT BREATHING, DISRUPTION OF BODILY FUNCTIONS, AND INVOLUNTARY MOVEMENTS. THESE SYMPTOMS ARE FOLLOWED BY CESSATION OF BREATHING AND DEATH. NERVE AGENTS ACT VERY RAPIDLY. EXAMPLES ARE THE 'G' SERIES OF AGENTS, TABUN SARIN, AND SOMAN, AND V-AGENTS SUCH AS VX.

INCAPACITATING AGENTS DISRUPT THE HIGHER REGULATORY ACTIVITY OF THE BRAIN AND PRODUCE PHYSIOLOGICAL AND/OR MENTAL EFFECTS THAT CAN LAST FOR HOURS OR DAYS AFTER EXPOSURE AND RENDER INDIVIDUALS INCAPABLE OF CONCERTED EFFORTS. THEY ARE NOT DESIGNED TO CAUSE INJURY AND CASUALTIES WILL RECOVER WITHOUT TREATMENT.

ALTHOUGH RIOT CONTROL AGENTS ARE NOT DEFINED AS BEING CHEMICAL WARFARE AGENTS BY THE UNITED STATES I WILL ADDRESS THEM HERE BECAUSE THEY HAVE BEEN USED IN WARFARE AND THEY HAVE BEEN MISTAKEN FOR THE MORE TOXIC CW AGENTS. A RIOT CONTROL AGENT, AS DISTINGUISHED FROM A CHEMICAL WARFARE AGENT, IS DEFINED AS, "A CHEMICAL THAT PRODUCES TEMPORARY IRRITATING OR DISABLING EFFECTS WHEN IN CONTACT WITH THE EYES OR WHEN INHALED." RIOT CONTROL AGENTS ARE OF TWO TYPES; TEAR PRODUCING AND VOMITING COMPOUNDS. IT SHOULD BE NOTED THAT RIOT CONTROL AGENTS CAN CAUSE SERIOUS ILLNESS OR DEATH IF USED IN CONFINED SPACES.

TEAR AGENTS CAUSE THE FLOW OF TEARS AND IRRITATION OF THE UPPER RESPIRATORY TRACT AND SKIN. HIGH CONCENTRATIONS CAN CAUSE NAUSEA AND VOMITING. SOME TEAR AGENTS CAN ALSO PRODUCE SYMPTOMS ASSOCIATED WITH CHOKING AGENTS AND VOMITING COMPOUNDS. EXAMPLES ARE AGENTS WITH THE CODES CN AND CS.

VOMITING AGENTS LEAD TO GREAT DISCOMFORT BY CAUSING, IN PROGRESSIVE ORDER, IRRITATION OF THE EYES AND MUCOUS MEMBRANES, COUGHING, SEVERE HEADACHE, PAIN AND TIGHTNESS IN THE CHEST, AND NAUSEA AND VOMITING. ADAMSITE IS AN EXAMPLE.

HISTORICALLY, MANKIND HAS USED ONE FORM OR ANOTHER OF CHEMICAL WARFARE SINCE WARFARE BEGAN. MILITARY USE OF IRRITATING SMOKE AND POISONOUS FUMES HAVE BEEN REPORTED AS FAR BACK AS THE GREEK PELOPONNESIAN WAR AND THE ROMAN EMPIRE. HOWEVER, IT WAS NOT UNTIL WORLD WAR I THAT CHEMICAL SCIENCE AND MILITARY TECHNOLOGY HAD ADVANCED ENOUGH SO THAT CHEMICAL AGENT USE COULD PRODUCE SIGNIFICANT RESULTS.

DURING WORLD WAR I, CHEMICAL AGENTS WERE USED ON ALL FRONTS. THE FIRST CHEMICAL BATTLE OF WORLD WAR I OCCURRED AT YPRES, FRANCE, ON 22 APRIL 1915. THE GERMANS USED 180 TONS OF CHLORINE, DISPENSED FROM 5,730 CANISTERS. THIS ATTACK PRODUCED THOUSANDS OF CASUALTIES AND A 6 KILOMETER GAP IN THE ALLIED LINE. THIS

ATTACK WAS THE BEGINNING OF MANY CHEMICAL AGENT ATTACKS INITIATED BY BOTH SIDES. AVAILABLE INDUSTRIAL CHEMICALS WERE USED AT FIRST BUT WERE FOLLOWED BY CHEMICALS DEVELOPED FOR USE IN WAR. AGENTS USED INCLUDED CHOKING, VOMITING, BLOOD, AND BLISTER TYPES. DURING THE WAR, CHEMICAL AGENTS WERE USED AS FAST AS THEY COULD BE MANUFACTURED.

DATA SHOW THAT 124,000 TONS OF TOXIC AGENTS WERE USED DURING THE WAR. FOR THE COUNTRIES ENGAGING IN CHEMICAL WARFARE, THIS USE RESULTED IN 1.3 MILLION CASUALTIES, OR 4.6 PER CENT OF THE TOTAL NUMBER OF CASUALTIES. NINETY ONE THOUSAND OF THESE CHEMICAL CASUALTIES DIED. OF THE 1.3 MILLION CHEMICAL CASUALTIES, GERMANY, FRANCE, AND THE BRITISH EMPIRE HAD APPROXIMATELY 200,000 EACH, RUSSIA 475,000, AND THE UNITED STATES 72,000. THESE NUMBERS, EXPRESSED AS PERCENTAGES, ARE AS FOLLOWS: 3.5 PER CENT FOR GERMANY AND FRANCE, 7.3 FOR THE BRITISH EMPIRE, 7.5 FOR RUSSIA, AND 26.8 FOR THE UNITED STATES.

ONE RESULT OF THE WIDESCALE USE OF CHEMICAL AGENTS IN WORLD WAR I WAS A REACTION THAT LED TO THE 1925 GENEVA PROTOCOL FOR THE PROHIBITION OF THE USE IN WAR OF ASPHYXIATING, POISONOUS OR OTHER GASES, AND BACTERIOLOGICAL METHODS OF WARFARE. THIS INTERNATIONAL AGREEMENT, TO WHICH 118 COUNTRIES ARE A PARTY, PROHIBITS THE USE OF CHEMICAL WEAPONS BUT NOT THEIR PRODUCTION OR STOCKPILING. THE PROTOCOL IS IN EFFECT A "NO FIRST USE" AGREEMENT BECAUSE MANY OF THE PARTIES SIGNED WITH THE RESERVATION THAT THE PROTOCOL WAS NOT BINDING IF CHEMICAL AGENTS WERE USED BY AN ENEMY OR ITS ALLIES. SOME RESERVATIONS ALSO MADE THE PROTOCOL NONBINDING IN THE CASE OF COUNTRIES THAT ARE NOT A PARTY TO THE PROTOCOL.

DESPITE THE EXISTENCE OF THE GENEVA PROTOCOL THERE HAVE BEEN CONFIRMED OR ALLEGED CHEMICAL AGENT ATTACKS IN 19 DIFFERENT COUNTRIES IN EUROPE, ASIA, AFRICA, AND THE MIDDLE EAST SINCE WORLD WAR I. THE MORE WIDELY KNOWN INCLUDE USE IN ETHIOPIA AND YEMEN. THE CHEMICAL AGENTS USED IN THESE ATTACKS WERE OF THE TYPES DEVELOPED DURING WORLD WAR I.

THE MOST RECENT USE OF CHEMICAL AGENTS HAS BEEN IN THE IRAN/IRAQ WAR. UNITED NATIONS REPORTS INDICATE THAT BLISTER, NERVE, AND POSSIBLY CHOKING AND BLOOD AGENTS HAVE BEEN USED. THE FIRST CONFIRMED USE OF NERVE AGENTS, WHICH WERE DEVELOPED IN THE WORLD WAR II AND POST-WORLD WAR II TIME FRAMES, OCCURRED IN THIS WAR. RIOT CONTROL AGENTS WERE ALSO USED.

CHEMICAL AGENTS HAVE BEEN USED WHEN A PERCEIVED MILITARY ADVANTAGE COULD BE GAINED. ALTHOUGH CHEMICAL AGENTS HAVE NEVER

BEEN THE PRIMARY MEANS OF VICTORY, THEY HAVE ADDED TO MILITARY POWER AND HAVE HAD A SIGNIFICANT EFFECT ON THE OUTCOME OF CERTAIN BATTLES. IN THE FUTURE, OTHER COUNTRIES ARE LIKELY TO USE CHEMICAL AGENTS BECAUSE NOT ONLY ARE THEY EFFECTIVE BUT THEY ARE ALSO RELATIVELY INEXPENSIVE AND EASY TO ACQUIRE.

THANK YOU FOR YOUR ATTENTION. I WILL BE GLAD TO ANSWER ANY QUESTIONS YOU MAY HAVE.

U.S. DEFINITION

CHEMICAL WARFARE AGENT = "A CHEMICAL SUBSTANCE WHICH IS INTENDED FOR USE IN MILITARY OPERATIONS TO KILL, SERIOUSLY INJURE, OR INCAPACITATE MAN THROUGH ITS PHYSIOLOGICAL EFFECTS. EXCLUDED FROM CONSIDERATION ARE RIOT CONTROL AGENTS, HERBICIDES, SMOKE, AND FLAME."

TYPES OF CW AGENTS

TYPE/EFFECTS:	EXAMPLES:
BLISTER (VESICANT) - DAMAGE CELLS. CAUSE BLISTER, DAMAGE LUNGS, AFFECT EYES. SOME HAVE DELAYED ACTION, SOME SOME IMMEDIATE.	SULFUR MUSTARD (H OR HD) NITROGEN MUSTARD (HN) PHOSGENE OXIME (CX) LEWISITE (L)
CHOKING - IRRITATE LUNGS AND EYES. DAMAGE TO LUNGS RESULTS IN FLUID IN LUNGS. IMMEDIATE TO DELAYED ACTION.	PHOSGENE (CG)

CHART

TYPES OF CW AGENTS (CONT.)

TYPE/EFFECTS:	EXAMPLES:
BLOOD - INTERFERE WITH USE OF OXYGEN AT THE CELLULAR LEVEL. CK ALSO IRRITATES LUNGS AND EYES. RAPID ACTION.	HYDROGEN CYANIDE (AC) CYANOGEN CHLORIDE (CK)
NERVE - INHIBIT NEURAL ENZYME CAUSING IMPROPER TRANSMISSION OF NERVE IMPULSES. CAUSES CONVULSIONS, DISRUPTS BODILY FUNCTIONS, AND STOPS BREATHING BY PARALYSIS. RAPID ACTION.	TABUN (GA) SARIN (GB) SOMAN (GD) VX
INCAPACITATING - PRODUCE TEMPORARY PHYSIOLOGICAL AND/OR MENTAL EFFECTS (HOURS - DAYS) THAT PREVENT CONCERTED EFFORT.	BZ

CHART

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U.S. DEFINITION

RIOT CONTROL AGENT = "A CHEMICAL THAT PRODUCES TEMPORARY IRRITATING OR DISABLING EFFECTS WHEN IN CONTACT WITH THE EYES OR WHEN INHALED."

NOTE: CAN CAUSE SERIOUS ILLNESS OR DEATH IF USED IN CONFINED SPACES.

RIOT CONTROL AGENTS

TYPE/EFFECTS:	EXAMPLES:
TEAR - CAUSE FLOW OF TEARS AND IRRITATION OF UPPER RESPIRATORY TRACT AND SKIN. CAN CAUSE NAUSEA AND VOMITING.	CHLOROACETOPHENONE (CN) O-CHLOROBENZYL-MALONONITRILE (CS)
VOMITING - IRRITATION, COUGHING, SEVERE HEADACHE, TIGHTNESS IN CHEST, NAUSEA, VOMITING.	ADAMSITE (DM)

CHART

HISTORICAL PERSPECTIVE

DATE	AGENTS	USED BY	USED AGAINST
429 B.C.	POISONOUS FUMES	SPARTANS	ATHENIANS
(1864) -- EUROPEAN POWERS AGREE TO BAN POISON GAS USE --------------------			
1865	USE CONSIDERED	UNION	-
1915-1919 -- WORLD WAR I			
	CHOKING, BLOOD, BLISTER, AND IRRITANT	GERMANY	ENEMIES
		FRANCE	
		BRITAIN	
		AUSTRO-HUNGARY	
		RUSSIA	
		UNITED STATES	
925) -- GENEVA PROTOCOL --			
1930'S	ALLEGATIONS	MANCHURIA	INSURGENTS
1935-1936	VESICANTS AND ASPHYXIANTS; 700 TONS; 15,000 CASUALTIES	ITALY	ETHIOPIA
1936	ALLEGED TEAR GAS USE	SPAIN	INSURGENTS
(1937-1943) -- DEVELOPMENT OF FIRST NERVE GASES BY GERMANY ---------------			
1937-1945	CN, DA, DC, PHOSGENE, AC, CHLOROPICRIN, MUSTARD, & LEWISITE	JAPAN	CHINA
1939-1945 -- WORLD WAR II			
1939	MUSTARD	GERMANY	WARSAW, PL
1939	MUSTARD LANDMINES	POLAND	GERMANY

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HISTORICAL PERSPECTIVE (CONT.)

1942	CHEMICAL MORTARS	GERMANY	RUSSIA
1941	CYANIDE HAND GRENADES	JAPAN	US
1945-1949	ALLEGATIONS	CHINA	CIVIL WAR
1947	ALLEGATIONS	FRANCE	VIETNAMESE
1948	ALLEGATIONS	ISRAEL	EGYPT
1949	ALLEGATIONS	GREECE	GUERRILLAS
1957	ALLEGATIONS	CUBA	GUERRILLAS
1957	ALLEGATIONS	FRANCE	ALGERIA
1958	ALLEGATIONS	FRANCE/SPAIN	MOROCCO
1958	ALLEGATIONS	CHINA	TAIWAN
1963-1967	40 INCIDENTS REPORTED	EGYPT	YEMEN
1965	ALLEGATIONS	IRAQ	KURDS
1961-1970	ALLEGATIONS	US	VIETNAM
1968	ALLEGATIONS	PORTUGAL	REBELS
1969	ALLEGATIONS	ISRAEL	PALESTINE
1970	ANTI-PLANT CHEMICALS	ANGOLA/ PORTUGAL	REBELS
1970	ALLEGATIONS (WATER POISONS)	RHODESIA	REBELS
1975-1987	ALLEGATIONS	LAOS/VIETNAM	CAMBODIA
1979	ALLEGATIONS	CHINA	VIETNAM
1979	ALLEGATIONS	VIETNAM	CHINA

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HISTORICAL PERSPECTIVES (CONT.)

1979-1989	ALLEGATIONS	USSR	AFGHANISTAN
1983-1988	MUSTARD, NERVE	IRAQ	IRAN
1985-1988	MUSTARD, CHOKING/ BLOOD (?)	IRAN	IRAQ
1987-1988	RIOT CONTROL, LETHAL	IRAQ	KURDS
1987	ALLEGATIONS	LIBYA	CHAD

CHART

Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare

Signed at Geneva June 17, 1925
Entered into force February 8, 1928
Ratification advised by the U.S. Senate December 16, 1974
Ratified by U.S. President January 22, 1975
U.S. ratification deposited with the Government of France April 10, 1975
Proclaimed by U.S. President April 29, 1975

The Undersigned Plenipotentiaries, in the name of their respective Governments:

Whereas the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices, has been justly condemned by the general opinion of the civilized world; and

Whereas the prohibition of such use has been declared in Treaties to which the majority of Powers of the World are Parties; and

To the end that this prohibition shall be universally accepted as part of International Law, binding alike the conscience and the practice of nations;

Declare:

That the High Contracting Parties, so far as they are not already Parties to Treaties prohibiting such use, accept this prohibition, agree to extend this prohibition to the use of bacteriological methods of warfare and agree to be bound as between themselves according to the terms of this declaration.

The High Contracting Parties will exert every effort to induce other States to accede to the present Protocol. Such accession will be notified to the Government of the French Republic, and by the latter to all signatory and acceding Powers, and will take effect on the date of the notification by the Government of the French Republic.

The ratifications of the present Protocol shall be addressed to the Government of the French Republic, which will at once notify the deposit of such ratification to each of the signatory and acceding Powers.

The instruments of ratification of and accession to the present Protocol will remain deposited in the archives of the Government of the French Republic.

The present Protocol will come into force for each signatory Power as from the date of deposit of its ratification, and, from that moment, each Power will be bound as regards other powers which have already deposited their ratifications.

IN WITNESS WHEREOF the Plenipotentiaries have signed the present Protocol.

DONE at Geneva in a single copy, this seventeenth day of June, One Thousand Nine Hundred and Twenty-Five.

Attachment 1

GENEVA PROTOCOL

States Parties to the Protocol for the Prohibition of the use in War
of Asphyxiating, Poisonous or Other Gases, and of Bacteriological
Methods of Warfare, Done at Geneva June 17, 1925

States which have deposited instruments of ratification or accession, or continue to be bound as the result of succession agreements concluded by them or by reason of notification given by them to the Secretary-General of the United Nations:

	Argentina–May 12, 1969
1 a b	Australia–Jan. 22, 1930
	Austria–May 9, 1928
1 a b 2	Bahamas, The
2	Barbados–June 22, 1976
1 a b	Belgium–Dec. 4, 1928
6	Bhutan–June 12, 1978[6]
1 a b 2	Botswana
	Brazil–Aug. 28, 1970
1 a b	Bulgaria–Mar. 7, 1934
1 a b 2	Burma
1 a b	Canada–May 6, 1930
	Central African Republic–July 31, 1970
1 a b	Chile–July 2, 1935
1 a b	China, People's Republic of–Aug. 9, 1952
	China (Taiwan)–Aug. 7, 1929
7	Comoros
	Cuba–June 24, 1966
	Cyprus–Dec. 12, 1966
1 b	Czechoslovakia–Aug. 16, 1938
	Denmark–May 5, 1930
7	Djibouti
	Dominican Republic–Dec. 8, 1970
	Ecuador–Sept. 16, 1970
	Egypt–Dec. 6, 1928
1 a b	Estonia–Aug. 28, 1931
	Ethiopia–Sept. 18, 1935
1 a b	Fiji–Mar. 21, 1973
	Finland–June 26, 1929
1 a b 3	France–May 9, 1926
	Gambia, The–Nov. 16, 1966
	German Democratic Republic
	Germany, Federal Republic of–Apr. 25, 1929
	Ghana–May 3, 1967
	Greece–May 30, 1931
1 a b	Grenada
1 a b 2	Guyana
	Holy See–Oct. 18, 1966
	Hungary–Oct. 11, 1952
	Iceland–Nov. 2, 1967
1 a b	India–Apr. 9, 1930
	Indonesia–Jan. 26, 1971
	Iran–July 4, 1929
1 a b	Iraq–Sept. 8, 1931
	Ireland–Aug. 18, 1930
1 a b	Israel–Feb. 20, 1969
	Italy–Apr. 3, 1928
	Ivory Coast–July 27, 1970
	Jamaica–July 31, 1970
	Japan–May 21, 1970
1 a b d	Jordan–Jan. 20, 1977
	Kenya–July 6, 1970
1 a b d	Kuwait–Dec. 15, 1971
	Latvia–June 3, 1931
	Lebanon–Apr. 17, 1969
	Lesotho–Mar. 15, 1972
	Liberia–Apr. 2, 1927
1 b d	Libya–Dec. 29, 1971
	Lithuania–June 15, 1933
	Luxembourg–Sept. 1, 1936
	Madagascar–Aug. 12, 1967
	Malawi–Sept. 14, 1970
	Malaysia–Dec. 10, 1970
	Maldive Islands–Jan. 16, 1967
	Mali–Nov. 19, 1966
	Malta–Oct. 15, 1970
	Mauritius–Jan. 8, 1971
	Mexico–Mar. 15, 1932
	Monaco–Jan. 6, 1967

1 b	Mongolia–Dec. 6, 1968
	Morocco–Oct. 13, 1970
	Nepal–May 9, 1969
1 c 4	Netherlands–Oct. 31, 1930
1 a b	New Zealand–Jan. 22, 1930
	Niger–Apr. 19, 1967
1 a b	Nigeria–Oct. 15, 1968
	Norway–July 27, 1932
	Pakistan–June 9, 1960
	Panama–Dec. 4, 1970
1 a b	Papua New Guinea–Sept. 16, 1975
	Paraguay–Jan. 14, 1969
	Philippines–May 29, 1973
	Poland–Feb. 4, 1929
1 a b	Portugal–July 1, 1930
	Qatar–Sept. 16, 1976
1 a b	Romania–Aug. 23, 1929
	Rwanda–June 25, 1964
	Saudi Arabia–Jan. 27, 1971
1 a b 2	Seychelles
	Sierra Leone–Mar. 20, 1967
1 a b 2	Singapore
1 a b	South Africa–Jan. 22, 1930
1 a b	Spain–Aug. 22, 1929
	Sri Lanka–Jan. 20, 1954
	Sudan–Dec. 17, 1980
1 c 4	Suriname
1 a b 2	Swaziland
	Sweden–Apr. 25, 1930
	Switzerland–July 12, 1932
1 d	Syrian Arab Republic–Dec. 17, 1968
	Tanzania–Apr. 22, 1963
	Thailand–June 6, 1931
	Togo–Apr. 5, 1971
	Tonga–July 28, 1971
	Trinidad and Tobago–Nov. 30, 1970
	Tunisia–July 12, 1967
	Turkey–Oct. 5 1929
	Uganda–May 24, 1965
1 a b	Union of Soviet Socialist Republics–Apr. 5, 1928
1 a b 5	United Kingdom–Apr. 9, 1930
1 c	United States–Apr. 10, 1975
	Upper Volta–Apr. 12, 1977
	Uruguay–Apr. 12, 1977
	Venezuela–Feb. 8, 1928
1 a b	Vietnam–Sept. 23. 1980
1 b	Yemen Arab Republic (Sana)–Mar. 17, 1971
	Yugoslavia–Apr. 12, 1929
1 a b 2	Zambia

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1 a, b, c, d With reservations to Protocol as follows:

a—binding only as regards relations with other parties.

b—to cease to be binding in regard to any enemy States whose armed forces or allies do not observe provisions.

c—to cease to be binding as regards use of chemical agents with respect to any enemy State whose armed forces or allies do not observe provisions.

d—does not constitute recognition of or involve treaty relations with Israel.

2 By virtue of agreement with former parent State or notification to the Secretary General of the United Nations of succession to treaty rights and obligations upon independence.

3 Applicable to all French territories.

4 Applicable to Suriname and Curacao.

5 It does not bind India or any British Dominion which is a separate member of the League of Nations and does not separately sign or adhere to the Protocol. It is applicable to all colonies.

6 Deposited accession on June 12, 1978, but the French Government asked that accession take effect on date of notification by them—Feb. 19, 1979.

7 Included in declaration by France. Continued application has apparently not been determined.

Dr. Barry J. Erlick
Senior Biological Warfare Analyst
U.S. Army

BIOLOGICAL AND TOXIN AGENTS

Senator Glenn, Senator Nunn, Members of the Governmental Affairs Committee and Members of the Permanent Subcommittee on Investigations, I am pleased to appear before you to discuss the problem of the proliferation of biological and toxin weapons.

In November 1969, President Nixon unilaterally renounced the US offensive biological warfare program and three months later, similarly, renounced toxins as a method of warfare.

The establishment of the Biological and Toxin Weapons Convention of 1972, which prohibits the development, production, and stockpiling of biological and toxin weapons, was assisted by this initiative. Commonly referred to as the Biological Weapons Convention or the BWC, this agreement was ratified in 1975 by numerous countries. Currently, more than 100 countries, including most Middle East countries, are signatories. A major weakness of the BWC is the absence of verification provisions.

The list of traditional warfare agents covered under the BWC is long. However, the most commonly referred to infectious agents include the causative agents of anthrax, cholera, plague, Q fever, tularemia, and viral encephalomyelitides. The toxin agents include, blue-green algal toxins, botulinum toxins, enterotoxins, ricin, saxitoxin, and tetrodotoxin. Attachment A lists some important properties of four of these agents. *Bacillus anthracis* or anthrax bacteria is almost 100 percent fatal when one is exposed by aerosol to approximately 8,000 spores, and death will likely occur in less than seven days. *Francisella tularensis*, a bacteria that causes tularemia, known as rabbit fever, is highly infectious. Less than 10 organisms can cause disease with symptoms occurring in only 3 to 5 days. As many as 30 percent to 60 percent of those affected will die within 30 days, if not treated. The effects of saxitoxin, a shellfish toxin, are extremely rapid for a toxin. Within as little as 12 minutes this toxin can cause difficulty in breathing and paralysis. There is no known prophylaxis or therapy and it is estimated that the amount needed to cause death in 50 percent of those exposed is as low as 50 one-millionths of a gram, which represents a potency 1,000 times greater than the chemical nerve agent VX. The extremely potent botulinal toxins are produced by the bacteria *Clostridium botulinum* and are the cause of some deaths by food poisoning. Following ingestion of the toxin, gastrointestinal symptoms and paralysis occur in 1 to 3 days with a lethality as high as 60 percent. Aerosol exposure can be at least as deadly. The amount needed to cause death in 50 percent of those exposed can be as low as 5 one-millionths of a gram, which represents a potency 10,000 times greater than VX.

Industrial fermentation usually is concerned with products of a microorganism such as antibiotics or other biologicals. Toxins may be produced in the same manner. Alternatively, the organism itself can be the desired end-product. Attachment B illustrates a scheme by which large quantities of biological and toxin agents can be produced by the fermentation process. Bacteria have the ability to multiply very quickly as illustrated by the number pyramid. The heavy concentration of bacteria produced in a fermenter or bioreactor is apparent. The fermentation process, starting with a small seed culture and ending with a product such as anthrax bacteria, can be as short as 96 hours. New computerized systems are producing greater yields and higher quality products than in the past, and genetic engineering is changing the types of products generated. Additionally, some toxins can now be produced by synthetic means.

The ultimate purpose of material and equipment used for the development and production of biological and toxin agents is extremely difficult to determine. The possibility of concealing the development and production under a "dual use" cover poses significant problems in the detection of a foreign biological and toxin warfare program. Any nation can readily and legally obtain most of the essential production materials on the open market. Furthermore, very potent agents can be obtained from natural sources, such as infected wild animals, soil or spoiled food. Initially, the material, techniques, and the very organisms or toxins, are the same whether one is producing a vaccine or warfare agent. The ultimate objective, be it vaccine or weapon, depends on the intent of the user. Most production facilities utilizing microorganisms, including pharmaceutical plants and even breweries, can be converted to produce biological or toxin agents in a matter of hours, with modest prior provision.

The proliferation of chemical warfare weapons, as observed in the Middle East, has been followed by a similar proliferation of biological and toxin weapons, which represent a cheaper and less sophisticated alternative to chemical or nuclear weapons. The number of nations having or suspected of having offensive biological and toxin warfare programs has increased from four to ten since 1972. Some of these nations are unfriendly to the US; some are located in the Middle East; and some are signatories to the BWC. For the most part, these countries have selected the classical well known agents.

Thank you for your attention. I would be pleased to try to answer any questions you may have.

ATTACHMENT A

SELECTED BIOLOGICAL AND TOXIN WARFARE AGENTS

- ***BACILLUS ANTHRACIS*** **(ANTHRAX)**
  - PULMONARY INFECTION 95% FATAL
  - ANTIBIOTICS USUALLY INEFFECTIVE IN PULMONARY INFECTION
  - DEATH IN LESS THAN 7 DAYS AFTER EXPOSURE
- ***FRANCISELLA TULARENSIS*** **(TULAREMIA)**
  - HIGHLY INFECTIOUS (AS FEW AS 10 ORGANISMS NEEDED)
  - PNEUMONIA LIKE SYMPTOMS IN 3 [illegible] 5 DAYS
  - WITHOUT TREATMENT 30 TO 60% FATAL
- **SAXITOXIN (A SHELLFISH POISON)**
  - DIFFICULTY IN BREATHING/PARALYSIS IN 12 MINUTES TO 4 HOURS
  - NO EFFECTIVE PROPHYLAXIS OR THERAPY KNOWN
  - ESTIMATED HUMAN LD_{50} IS 50 MILLIONTHS OF A GRAM
  - 100 TO 1,000 TIMES MORE POTENT THAN NERVE AGENT VX
- **BOTULINAL TOXINS (BOTULISM)**
  - GASTROINTESTINAL SYMPTOMS AND PARALYSIS IN 1 TO 3 DAYS
  - LETHALITY AS HIGH AS 60% IN FOOD POISONING
  - ESTIMATED HUMAN LD_{50} LESS THAN 5 MILLIONTHS OF A GRAM
  - 1,000 TO 10,000 TIMES MORE POTENT THAN NERVE AGENT VX

ATTACHMENT B

Production of Biologicals by Fermentation

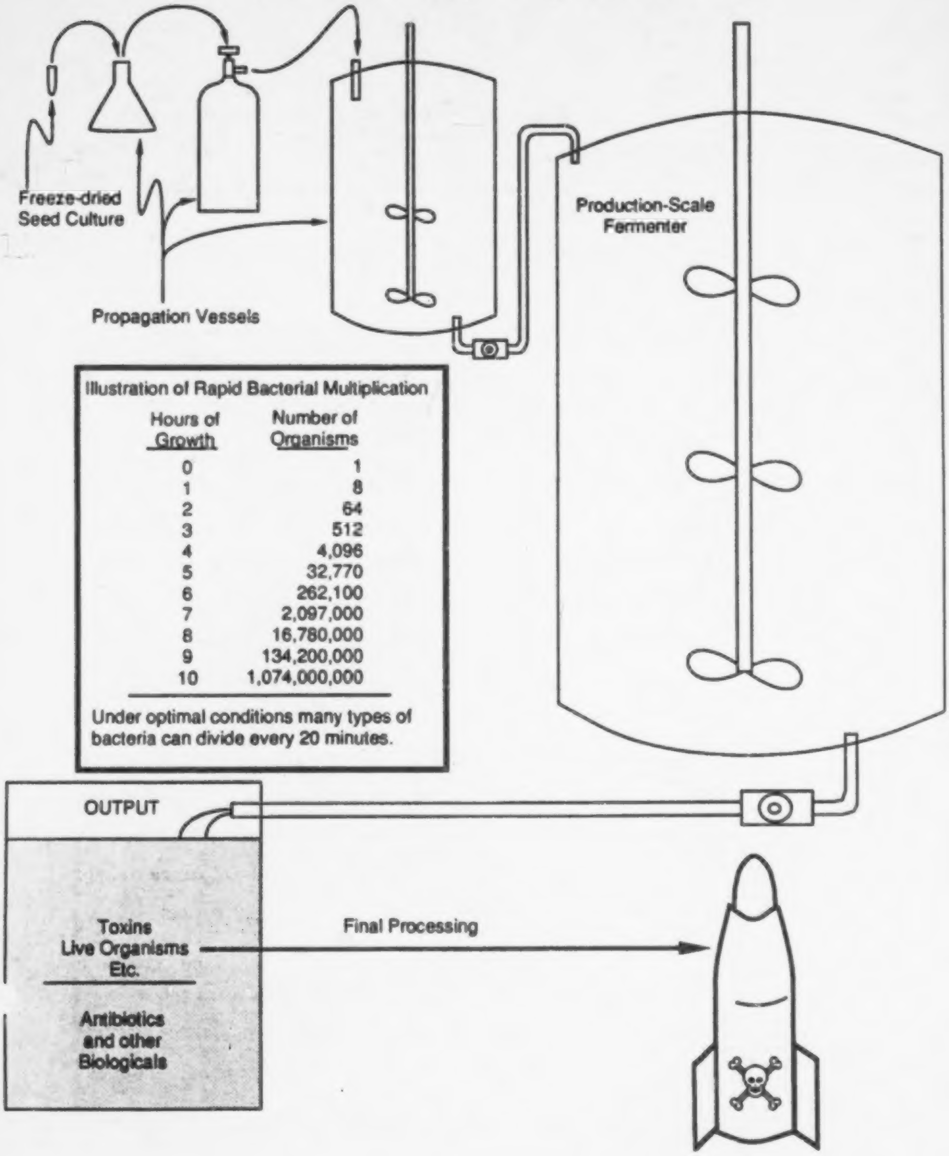
Freeze-dried
Seed Culture
Propagation Vessels
Production-Scale Fermenter
OUTPUT
Toxins
Live Organisms
Etc.
Antibiotics
and other
Biologicals
Final Processing

Illustration of Rapid Bacterial Multiplication

Hours of Growth	Number of Organisms
0	1
1	8
2	64
3	512
4	4,096
5	32,770
6	262,100
7	2,097,000
8	16,780,000
9	134,200,000
10	1,074,000,000

Under optimal conditions many types of bacteria can divide every 20 minutes.

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STATEMENT OF ROBERT MULLEN COOK-DEEGAN, M.D.
PHYSICIANS FOR HUMAN RIGHTS

BEFORE THE

COMMITTEE ON GOVERNMENTAL AFFAIRS
U.S. SENATE

9 February 1989

USE OF LETHAL POISON GAS AGAINST CIVILIANS IN IRAQI KURDISTAN

Thank you, Mr. Chairman. My name is Robert Cook-Deegan. I am a physician and a Fellow at the Kennedy Institute of Ethics at Georgetown University. I am here today representing Physicians for Human Rights, a Boston-based group of over 1,000 health professionals committed to bringing medical skills and influence to the prevention of human rights abuse throughout the world. I was one of three doctors who went to Turkey from the 6th to the 17th of October 1988, to investigate allegations that Iraq had used poison gas against its Kurdish population. The others were Howard Hu, an epidemiologist at the Harvard Medical School, and Asfandiar Shukri, who is chief of Emergency Medicine at Northwest General Hospital in Detroit and who served as interpreter (he speaks Kurdish). I will first describe what we found, then briefly put it in context.

We entered two refugee camps in southeastern Turkey, one containing 5,100 and the other 13,100 people who had fled northern Iraq. There we elicited consistent accounts

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of poison gas attacks, from bombs dropped by aircraft, releasing a foul-smelling yellow-gray cloud. Small animal and fowl died within minutes, and people near the bomb bursts began to die soon after. Their skin turned black, and blood-tinged fluid oozed from their noses and mouths. Their skin became thick and leathery after death. Eyewitnesses did not describe shrapnel wounds.

The attacks were against both civilian villages and Pesh Merga (Kurdish fighter) encampments. Eighteen of those completing our survey (69 percent) were civilians; 8 were Pesh Merga soldiers (31 percent). Their ages ranged from 6 to 70.

Those who survived described a complex of symptoms: difficulty breathing; burning throat; eyes burning and watering; runny nose; dizziness; nausea; vomiting; and headache. Their skin itched, oozing a clear yellowish fluid, and then formed large blisters filled with clear amber-colored fluid. Each of these symptoms was reported by over 65 percent of the 27 people who completed a 120-item questionnaire designed for this mission. We defined a "severe" profile of injury to include at least (1) symptoms of eye irritation; (2) shortness of breath or pain on breathing; (3) skin blistering; and (4) vomiting. Just under half of those within 250 meters of bomb bursts (8 of 17) had all four symptoms. These are the symptoms one would expect of poison gas.

One 70 year-old woman described the attack to us this way: "All of a sudden my eyes became blurry...and I became short of breath and felt terribly weak. It had a bad smell like garlic and my mouth became bitter. About two minutes later, I began to feel sick and after that my skin felt like it was burning. I saw a lot of animals die before I felt sick-- birds, chickens, hens, cattle, sheep, goats. And then I had difficulty breathing, my skin was burning, my eyes were burning and my nose was running. There was water oozing from my skin, my face and hands. The fluid was coming out yellowish, coming out from my skin which was severely burning and itching too."

We were able to compare answers of those attacked in the same villages but, at the time of our visit, living in different Turkish refugee camps. The camps were separated by over 100 kilometers, so these refugees had not been able to communicate. This gave us a good cross-check on details of the attack, and enabled us to verify that their accounts were indeed consistent. Those closer to bomb bursts were also more likely to have severe symptoms, as one would expect. We concluded that lethal poison gas was used against the Kurds on August 25, 1988. (Other Kurds from different parts of Iraq described attacks on other dates, these but were not included in our survey.)

Several weeks after we returned to the United States, we learned of another investigative team's findings. Gwynne Roberts, a freelance journalist for British television, had entered northern Iraq and taken soil samples from areas allegedly attacked. Analysis showed degradation products of sulfur mustard (yperite), a blistering poison gas that the German military began to use in World War I.

Our findings are consistent with the use of mustard gas, but mustard gas may not explain all our findings. The reports of death beginning within five minutes indicate that probably additional agents were employed, but several lethal chemicals are consistent with this finding of sudden death, and we cannot say definitively which were used. This should not obscure the more important conclusion, concurred with by several chemical weapons specialists, that the government of Iraq had used lethal poison gas against its own citizens.

My description of the events is perhaps somewhat technical. I think the true meaning of our findings is better expressed in the words of an eight year-old girl whom we met in the Mardin refugee camp. Aagiza lived in the village of Ekmala, and had not spoken at all for five weeks after the attacks, until a few days before we visited with her. At the time of the attack, she was several hundred meters away from her home tending livestock. One bomb hit near her house, where her mother, father, and 20-year-old brother were:

> I saw two airplanes overhead and they dropped some bomb, it made smoke, yellowish-white smoke. It had a bad smell like DDT, the powder they kill insects with. It had a bitter taste. After I smelled the gas, my nose began to run and my eyes became blurry and I could not see and my eyes started watering too. And I still have some of the effects like my blurry vision and I

> have these things [skin blisters] over my chest. I saw my parents fall down with my brother after the attack, and they told me they were dead. I looked at their skin and it was black and they weren't moving. And I was scared and crying and I did not know what to do. I saw their skin turn dark and blood coming out from their mouths and from their noses. I wanted to touch them, but they stopped me and I started crying again.

After these events, Aagiza left with her sisters, her younger brother, and her grandmother. They traveled several days over arduous mountain passes into Turkey, where they had been living for over a month at the time of our visit. When we interviewed her, Aagiza had no idea where she would be living in two months or even two weeks.

Our survey documents one small fragment of a dual catastrophe. The Iraqi chemical weapons attack on the Kurds is a catastrophe, first of all, in terms of the deaths, the injuries and the human suffering we have described. We may never know the true total of casualties; what we already know, however, fully justifies the conclusion that this was a premeditated public health disaster.

But this is a catastrophe in a second and even larger sense. It represents a major and dangerous breach in the international agreement that human beings, no matter what the circumstances of war, rebellion, or conflict, should never be subjected to poison gas or other chemical weapons. It is not merely human beings who are assaulted in such an attack; it is our common humanity. As physicians, we call for a total ban on the development, manufacture, deployment and use of these agents.

STATEMENT OF
DR. DEBORAH LIEF-DIENSTAG
CHAIRMAN OF THE DEPARTMENT OF PEDIATRICS
ST. JOHN'S EPISCOPAL HOSPITAL
SOUTH SHORE DIVISION
BEFORE THE
U.S. SENATE GOVERNMENTAL AFFAIRS COMMITTEE AND THE
U.S. SENATE PERMANENT SUBCOMMITTEE ON INVESTIGATIONS
HEARING ON
THE GLOBAL SPREAD OF CHEMICAL AND BIOLOGICAL WEAPONS:
ASSESSING CHALLENGES AND RESPONSES
February 9, 1989

Good morning Senator Glenn, Senator Nunn, and Members of the Committee. My name is Dr. Deborah Lief-Dienstag and I am the Director of Pediatrics at St. John's Episcopal Hospital in Far Rockaway, Queens, New York, a Division of Episcopal Health Services of Long Island under the direction of the Right Reverend Bishop Robert C. Witcher. Doctor Victor Burnett, the Hospital's Chairman of the Department of Medicine and I would like to thank the Committee for allowing me to appear before you this morning.

We have all heard of the reports of the use last year of chemical weapons during the Iran/Iraq conflict. According to reports from Iran, Iraq used these weapons against Kurdish civilians. At St. John's Episcopal Hospital we had the opportunity to observe, diagnose and treat a handful of these victims. As far as we know, St. John's Episcopal Hospital is the only hospital in the United States to have treated victims of chemical warfare since World War I.

On the evening of March 29, 1988, five civilian victims of the conflict were brought to our hospital; 3 girls ranging in ages from 9 to 12 years and 2 adults; a man and a woman. These people spoke no English, and our staff communicated with them through a Kurdish interpreter furnished by the Iranian Consulate in New York. The children told us the following story:

On the morning of March 16, 1988, planes were cited over the village of Halabje, Iraq, a Kurdish village on the Iran/Iraq border that had been captured by Iranian troops. Earlier, the children had been warned to go into the cellar of their homes for "safety," but the adults of the family did not accompany them. Suddenly, the children heard the sound of planes overhead, and they ran outside to see this unusual event. As the children looked upwards, they saw a dark cloud descend over the village. Soon, they started to cough and sneeze, their eyes began to burn and water, and they began to itch over their entire bodies. In the following hours, they experienced nausea and vomiting, and over the next several days, their skin began to blister and slough.

According to a brief medical note that accompanied them to the United States, the children and the other two patients had been treated in a hospital in Teheran and received what appeared to be medically appropriate burn care. Approximately two weeks after the attack, the children and the two adults were flown to St. John's in a medically equipped airplane chartered by the Iranian Government.

The Iranian officials who arranged the transfer to the United States explained that the patients had been sent abroad (1) because of the large number of chemical warfare victims taxing Iranian medical facilities and (2) to bring the plight of the victims to the attention of the world's medical community. The more severely ill patients either remained in Teheran or were brought to European countries. The five victims who arrived in the United States were apparently selected for their ability to travel, and not out of acute medical necessity.

The children, for whose treatment I was responsible, exhibited eye and skin burns and lung damage, in varying degrees of severity. All three of the girls had chemical burns to the eyes and were acutely sensitive to light. The children also had first- and deep second-degree burns on their arms, neck and faces, and one child exhibited burns on her chest and groin area as well. A first-degree burn penetrates the upper layer of the skin. A deep second-degree burn, which extends down to a deeper skin layer, is extremely painful and causes blistering and scarring.

All three of the girls had abnormal chest X-rays, showing scarred lung tissue. One of the girls had pneumonia and required supplementary oxygen because of difficulty breathing. We have supplied the Committee with photographs of the children as they appeared several days after their admission to the hospital.

The most severely ill of all the patients was the 30-year-old adult woman, who was admitted to our intensive care unit. Dr. Victor Burnett was primarily responsible for the treatment of this woman and the other adult patient.

The woman was pregnant at the time of the attack. Ten days after exposure to the poison gas, while still in Iran, she delivered premature twins who died shortly after birth. On arrival in the United States, her chief medical problems were chemical burns of the lungs and a secondary bacterial pneumonia. A secondary pneumonia is a pneumonia caused by bacterial growth in damaged lung tissue. Her lungs were so badly scarred that their ability to transfer oxygen from the air to her blood and blow off carbon dioxide was severely and permanently impaired. She will be a pulmonary cripple for the rest of her life. The woman also had chemical burns of both eyes and first- and second-degree burns of her chest, back, groin, leg and toes, all of which improved with treatment.

In treating the five patients, we consulted with Professor A. Heyndrickx, Chief of the Department of Toxicology, State

University of Ghent, Belgium and Project Director of the United Nations International Development Organization. Dr. Heyndrickx is an internationally recognized expert on the toxicology of chemical weapons, that is the identification and measurement of the effects of chemical poisons in humans. Dr. Heyndrickx performed toxicological tests on samples of hair, urine and blood of the victims we treated. He concluded that at least three war gases had been used in combination: mustard gas, an organic phosphate commonly known as nerve gas and cyanide or derivatives.

In a recent follow-up conversation, Dr. Heyndrickx reported that in his experience with victims of poison gas inhalation, damage to the patients' lungs was irreversible and progressively worsened.

The patients were seen and followed in the hospital by specialists in pulmonology, infectious disease, hematology, ophthalmology, dermatology, plastic surgery and mental health. My contact was primarily with the children, who were initially very frightened, suspicious and non-cooperative. Their one word of English was "Pepsi." Understandably, their experiences of the past weeks had left deep psychological scars. The children cried a great deal for their parents. They appeared to relive the horrors of walking about their village in the hours after the attack amidst the dead and dying.

What was most striking I think about the children, and if you look at the photographs I believe you'll agree, was not their burns. They appeared years older than their ages, almost like elderly women. During the course of their treatment, the girls were showered with toys and clothes and spent a great deal of time playing. But there remained a profound sadness about them, and many times one or the other would spontaneously begin to cry and would be joined by the other two.

Over the course of their three week hospital stay, the children warmed to our staff who succeeded in winning their confidence and affection. There was an outpouring of kindness and genuine concern towards the children, both from the hospital staff and the local community. In treating these patients we paid little attention to the politics, the publicity or the international tensions that occasioned their admission to our hospital. They were human beings in pain, and we did our best to heal and comfort them in the short time they were with us.

We are submitting for the record, copies of our treatment summaries for each of the patients, and a copy of Doctor Heyndrickx's report on the analysis of the patient's biological samples.

Senators, we would be happy to answer any questions you may have.

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voor
TOXICOLOGIE
CRIMINALISTIEK

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Report n° : 88/NY/PJ881

TO WHOM IT MAY CONCERN

CLINICAL TOXICOLOGICAL REPORTS AND CONCLUSION OF THE BIOLOGICAL SAMPLES OF MEN, SENT TO THE DEPARTMENT OF TOXICOLOGY AT THE STATE UNIVERSITY OF GHENT, FOR TOXICOLOGICAL INVESTIGATION

Prof. A. Heyndrickx, Head
Department of Toxicology, State University of Ghent,
Hospitaalstraat 13, 9000 Ghent, Belgium

Different biological samples (blood, urine and hair) of men (Kurdistan) were sent from the St. John's Episcopal Hospital in New York (United States of America).
We received hair, urine and blood dated April 2nd, 1988 and urine and plasma dated April 4th, 1988.

I. FIRST REPORT OF THE TOXICOLOGICAL ANALYSIS

First series of samples (blood, urine and hair) dated April 2nd, 1988, sent by St. John's Episcopal Hospital of New York (U.S.A.) of patients from Kurdistan.
The samples arrived in Ghent on April 3rd at 10.30 a.m.

A. CYANIDES OR ANALOGUES (URINE)

Reference value for blood : 0 - 10 µg %

AZIZI MOHAMMAD (M1) : 0,2 µg %
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 2,2 µg %
MOHAMMAD COBRA (n° 2) : 2,2 µg %
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 20,5 µg %
HASSAN NAZANIN (V1) : 4,1 µg %

(Determination of cyanides in blood was not possible because it was clotted).

B. YPERITE, MUSTARD GAS (URINE, HAIR)

Urine : colour test (qualitative test)
Hair : colour test + CAM

AZIZI MOHAMMAD (M1) : urine : positive
hair : negative or below detection limit

MOHAMMAD ABDOLGHADER JAVAN (n° 1) : urine : positive
hair : negative or below detection limit

MOHAMMAD COBRA (n° 2) : urine : positive
hair : negative or below detection limit

MOHAMMAD ABDOLGHADER REZAN (n° 3) : urine : strongly positive
hair : negative or below detection limit

HASSAN NAZANIN (V1) : urine : strongly positive
hair : negative or below detection limit

C. ARSENIC (URINE)

Reference value in urine : < 40,0 µg/g creatinine

AZIZI MOHAMMAD (M1) : 6,7 µg/g creatinine
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 15,1 µg/g creatinine
MOHAMMAD COBRA (n° 2) : 4,9 µg/g creatinine
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 28,6 µg/g creatinine
HASSAN NAZANIN (V1) : 12,7 µg/g creatinine

D. ACETYLCHOLINESTERASE ACTIVITY (BLOOD)

Method : Nenner
Reference value : 5,11 - 8,75 µmol/ml.min

AZIZI MOHAMMAD (M1) : 8,9 µmol/ml.min
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 9,6 µmol/ml.min
MOHAMMAD COBRA (n° 2) : sample was broken
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 6,7 µmol/ml.min
HASSAN NAZANIN (V1) : 7,5 µmol/ml.min

II. SECOND REPORT OF THE TOXICOLOGICAL ANALYSIS

Second series of samples (plasma and urine) dated April 4th, 1988, sent by St. John's Episcopal Hospital of New York (U.S.A.) of patients from Kurdistan.
The samples arrived in Ghent on April 5th at 11.05 a.m.

A. CYANIDES OR ANALOGUES (URINE)

Reference value for blood : 0 - 10 µg %

AZIZI MOHAMMAD (M1) : 3,8 µg %
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 1,6 µg %
MOHAMMAD COBRA (n° 2) : 12,6 µg %
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 5,7 µg %
HASSAN NAZANIN (V1) : 2,0 µg %

B. YPERITE, MUSTARD GAS (URINE)

Colour test (qualitative test)

AZIZI MOHAMMAD (M1) : slightly positive
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : slightly positive
MOHAMMAD COBRA (n° 2) : slightly positive
MOHAMMAD ABDOLGHADER REZAN (n° 3) : positive
HASSAN NAZANIN (V1) : positive

C. ARSENIC (URINE)

Reference value in urine : < 40,0 µg/g creatinine

AZIZI MOHAMMAD (M1) : 14,7 µg/g creatinine
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 5,6 µg/g creatinine
MOHAMMAD COBRA (n° 2) : 10,9 µg/g creatinine
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 13,0 µg/g creatinine
HASSAN NAZANIN (V1) : 30,0 µg/g creatinine

D. ACETYLCHOLINESTERASE ACTIVITY (PLASMA)

a. Method : Nenner
Reference value : 1,26 - 2,66 µmol/ml.min

b. Method : Morand-Laborit
Reference value : 50 % ± 10 %

AZIZI MOHAMMAD (M1) : a. 0,76 µmol/ml.min
b. 40,3 %

MOHAMMAD ABDOLGHADER JAVAN (n° 1) : a. 1,32 µmol/ml.min
b. 51,8 %

MOHAMMAD COBRA (n° 2) : a. 1,21 µmol/ml.min
b. 56,6 %

MOHAMMAD ABDOLGHADER REZAN (n° 3) : a. 1,4 µmol/ml.min
b. 49,7 %

HASSAN NAZANIN (V1) : a. 0,0 µmol/ml.min
b. 20,9 %

E. PSEUDOCHOLINESTERASE ACTIVITY (PLASMA)

Reference value : DN (Dibucaîne) > 70) homozygote normal
FN (Fluoride) 55 - 70)

AZIZI MOHAMMAD (M1) : DN : 88
FN : 65

MOHAMMAD ABDOLGHADER JAVAN (n° 1) : DN : 92
FN : 42

MOHAMMAD COBRA (n° 2) : DN : 87
FN : 66

MOHAMMAD ABDOLGHADER REZAN (n° 3) : DN : 91
FN : 68

HASSAN NAZANIN (V1) : DN : 87
FN : 59

CONCLUSION

The results of blood and urine confirm that at least three wargases, in combination have been used : mustard gas (Yperite), an organic phosphate which inhibits the human plasma acetylcholinesterase (Tabun, Soman, Sarin, VX or analogues) and cyanide or derivatives (cyanogen chloride, CN^- or analogues).

The amounts found are very high and fatal.

There is no scientific doubt that those patients are lethal intoxicated by those chemical war agents.

Ghent, April 6th, 1988

Professor A. HEYNDRICKX
Head
Department of Toxicology
State University of Ghent
Belgium

Prof. Dr. A. Heyndrickx

ST. JOHN'S EPISCOPAL HOSPITAL SOUTH SHORE
327 Beach 19 Street, Far Rockaway, New York 11691 • (718) 917-3000

April 5, 1988

Amir H. Zamaninia
First Secretary
Permanent Mission of the Islamic Republic of Iran
to the United Nations
622 Third Avenue
New York, N.Y. 10017

RE: JAVAN ABDOLLAH

Dear Mr. Zamaninia:

Pursuant to your request, a summary of the course of treatment at St. John's Episcopal Hospital for the above referenced patient follows.

Javan is a 12 year old female admitted on 3/30/88, transported from Iraq, status post toxic chemical exposure in the middle of March. She sustained chemical burns on the backs of the lower extremities and left side of her trunk, abdomen and left thigh, as well as first degree burns to the face. She has a small superficial eschar on the anterior left thigh which, according to the plastic surgeons, is healing spontaneously and will not require plastic surgery, and is not presently being treated except for dry dressings as needed. She also sustained a chemical conjunctivitis and was examined by the ophthalmologists who prescribed various medications such as Garamycin ophthalmic ointment, Decadron ointment and Vasocidin. She also initially presented with a chemical pneumonitis with a moderate nonproductive cough and an increase in interstitial markings throughout the lungs on chest x-ray, normal arterial blood gas, no respiratory distress, and a carboxyhemoglobin of 1.5%. No treatment was required except for close observation for any signs of increasing pulmonary fibrosis.

Her white blood cell counts have remained stable at around 10,000, as well as stable hematocrits. Blood cultures were negative. She does have elevated liver function tests with AST of 100 and ALT of 81, alkaline phosphatase 176; normal bilirubin. A hepatitis screen was obtained and is pending to rule out hepatitis. She received a tetanus toxoid booster and a PPD was placed to rule out tuberculosis, which was negative.

She has been eating well, appears comfortable and in good spirits, and is very cooperative with the doctors' and nurses' requests.

Sincerely,

Deborah Lief-Dienstag
Deborah Lief-Dienstag, M.D.
Chairman, Department of Pediatrics

DLD:emp

ST. JOHN'S EPISCOPAL HOSPITAL SOUTH SHORE
327 Beach 19 Street, Far Rockaway, New York 11691 • (718) 917-3000

April 5, 1988

Amir H. Zamaninia
First Secretary
Permanent Mission of the Islamic Republic
of Iran to the United Nations
622 Third Avenue
New York, N.Y. 10017

RE: Rezan Abdollah

Dear Mr. Zamaninia:

Pursuant to your request, a summary of the above referenced patient's course of treatment at St. John's Episcopal Hospital, South Shore follows:

Rezan Abdollah is a 9 year old Iraqi female admitted to St. John's Episcopal Hospital, South Shore on 3/29/88 after a history of exposure to toxic chemical agents on 3/16/88. The exposure was reportedly due to an attack on the City of Halabje, Iraq. The exact etiologic agent is unknown. Upon presentation to St. John's, physical examination revealed the following positive findings.

There were burns to approximately 10% of her total body surface area located on the right side of her face, neck, trunk and buttocks. The burns on her trunk were second degree, and surrounded by an erythematous hyperpigmented area without open wound or discharge noted. The remainder of her burns were first degree and all were healing well. As per plastic surgery consultation, twice daily dressing changes with application of Silvadene ointment is being done to the second degree burns on the right flank and epithelialization is proceeding well. Tetanus toxoid was given.

Rezan's conjunctivae were bilaterally injected, however, vision was intact. As per ophthalmologic consultation, steroid and antibiotic drops are being applied topically to each eye three times a day.

Rezan presented with a coarse non-productive cough, and upon auscultation of her lungs, coarse breath sounds were heard with scattered rales bilaterally. Chest x-ray revealed blunting of the left heart border with diffusely increased interstitial markings and a possible lingular infiltrate. Arterial blood gas revealed pH 7.50, pCO2 39, pO2 93, O2 Sat. 98%. Rezan was afebrile and blood cultures were drawn. As per pulmonary consultation, treatment was begun with IV Cefadyl to rule out a possible bacterial superinfection of a chemical pneumonitis. Carboxyhemoglobin level obtained was 2.6%

No other positive findings were found on physical examination and EKG was WNL. Admission CBC showed Wbc count of 4.7 with 36 polys, 2 bands, 53 lymphs, 6 eosinophils and platelet count of 225,000. Hematocrit was 32%.

At present her problems remain:

1. Burns of first and second degree to the right side of her body requiring twice daily treatment and dressing changes.

2. Chemical conjunctivitis being treated three times daily with steroids and antibiotics topically.

3. Chemical pneumonitis currently being treated with Keflex P.O. for prophylaxis against bacterial superinfection.

4. Stool cultures and hepatitis screenings are pending at present. Tuberculosis testing negative.

5. She takes a regular diet well and is being followed by plastic surgery, ophthalmology and pulmonary consultations.

Sincerely,

Deborah Lief-Dienstag

Deborah Lief-Dienstag, M.D.
Chairman
Department of Pediatrics

DLD/am

ST. JOHN'S EPISCOPAL HOSPITAL SOUTH SHORE
327 Beach 19 Street, Far Rockaway, New York 11691 • (718) 917-3000

April 5, 1988

Amir H. Zamaninia
First Secretary
Permanent Mission of the Islamic Republic
of Iran to the United Nations
622 Third Avenue
New York, New York 10017

Re: Nazanin Hassan

Dear Mr. Zamaninia:

Pursuant to your request, a summary of the above referenced patient's course of treatment at St. John's Episcopal Hospital/South Shore follows:

Nazanin Hassan is a 30-year-old Kurdish woman who was flown to JFK airport and admitted to St. John's Episcopal Hospital/South Shore on 3/29/88 for treatment of injuries reportedly suffered after exposure to a currently unidentified toxic gas on 3/15/88.

Upon examination, the patient was found to have chemical burns of the chest, groin, right lower extremity and both feet. She had bilateral conjunctivitis and keratitis and evidence of a pneumonia. The WBC was 25,000 and the chest x-ray showed bilateral basilar infiltrates. The ABG on room air was pH 7.46, pCO_2 50, pO_2 39, O_2 Sat. 76%, CO_2 37, HCO_3 36.

After initial evaluation, the patient was seen by several medical consultants including a pulmonologist, dermatologist, ophthalmologist, plastic surgeon and infectious disease physician. The patient was treated with oxygen, I.V. antibiotics (initially claforan and subsequently mezlocillin and gentamycin), bronchodilators, topical skin medications and eye drops containing an antibiotic and corticosteroids.

The patient's condition has gradually improved under the supervision of her attending physician, consultants, medical house staff and nursing staff in the Intensive Care Unit. Currently her WBC is declining (16,200). Chest x-ray and ABG's are improving. She is afebrile, able to sit comfortably at the bedside, as well as take food and medications orally.

Sincerely,
Victor Burnett
Victor Burnett, M.D.
Chairman
Department of Medicine

VB:md

ST. JOHN'S EPISCOPAL HOSPITAL SOUTH SHORE
327 Beach 19 Street, Far Rockaway, New York 11691 • (718) 917-3000

April 5, 1988

Amir H. Zamaninia
First Secretary
Permanent Mission of the Islamic Republic
of Iran to the United Nations
622 Third Avenue
New York, New York 10016

Re: M. Azizi

Dear Mr. Zamaninia:

Pursuant to your request, a summary of the above referenced patient's course of treatment at St. John's Episcopal Hospital/South Shore follows:

The patient is a 25-year-old Kurdish man admitted to St. John's Episcopal Hospital on March 29, 1988. He was flown into JFK airport and transferred to the hospital via ambulance. The patient was brought for treatment of injuries reportedly suffered after exposure to a toxic gas approximately fifteen days prior to admission.

Upon arrival at St. John's Episcopal Hospital, he was in mild respiratory distress and had a productive cough. He had a marked bilateral conjunctivitis and a unilateral keratitis. He had skin lesions on the face, the right arm, back and scrotum. Exam of the lungs revealed diffuse rales. There was no infiltrate on chest x-ray. Arterial blood gases on room air showed a pH 7.49, pCO$_2$ 56, saturation 91%, CO$_2$ 29, HCO$_3$ 28. The WBC was elevated.

The patient was treated with oxygen, IV antibiotics (cephapirin), bronchodilators, topical skin medications, and eye drops containing an antibiotic and corticosteroids. He has been seen in consultation by a pulmonologist, dermatologist, ophthalmologist, plastic surgeon and infectious disease physician.

The patient's condition has improved under the supervision of his attending physician, consultants, medical house staff and nursing staff. His WBC and temperature have returned to normal. The arterial blood gases are improved. The eye and skin lesions have improved. The hoarseness has resolved. The patient still has persistent rales.

Sincerely yours,

Victor Burnett

Victor Burnett, M.D.
Chairman
Department of Medicine

VB.ca

ST. JOHN'S EPISCOPAL HOSPITAL SOUTH SHORE
327 Beach 19 Street, Far Rockaway, New York 11691 • (718) 917-3000

April 5, 1988

Amir H. Zamaninia
First Secretary
Permanent Mission of the Islamic Republic
of Iran to the United Nations
622 Third Avenue
New York, N.Y. 10017

RE: Kobra Mohammad

Dear Mr. Zamaninia:

Pursuant to your request, a summary of the above referenced patient's course of treatment at St. John's Episcopal Hospital, South Shore follows:

Kobra Mohammad is a 9 year old Iraqi female admitted to St. John's Episcopal Hospital, South Shore on 3/29/88 after exposure to toxic chemical agents on 3/16/88. The exposure was reportedly due to an attack on the City of Halabje, Iraq. The exact etiologic agent is unknown. Upon presentation to St. John's, physical examination revealed the following positive findings.

First degree burns to left ankle and face, healing well. As per plastic surgery consultation, no treatment was necessary.

Kobra's conjunctivae were very injected and a clear discharge was noted. As per ophthalmologic consultation, steroid and antibiotic drops are being applied three times a day for her chemical conjunctivitis. Vision is however intact.

Auscultation of her lungs was WNL.

Chest x-ray showed diffuse, non-specific increase in pulmonary vascular markings. ABG showed pH 7.46, pCO2 35, pO2 65. O2 Sat. 94%. No treatment was felt necessary for mild chemical pneumonitis.

Physical examination otherwise normal, as was EKG. CBC on admission showed Wbc 10 with 67 polys, 19 lymphs, 6 monos, 8 eos. Platelet count was 470,000 and hematocrit 42%. Carboxyhemoglobin level was 1.7%.

Present problems are therefore:

1. First degree burns to face and left ankle not requiring treatment.

2. Chemical conjunctivitis being teated three times daily with steroids and antibiotics applied topically.

3. Mild chemical pneumonitis not requiring treatment.

4. Stool cultures and hepatitis screenings are pending. Tuberculosis testing negative.

5. She takes a regular diet well and is being followed by plastic surgery and ophthalmology consultations.

Sincerely,
Deborah Lief-Dienstag MD
Deborah Lief-Dienstag, M.D.
Chairman
Department of Pediatrics

DLD/am

PREPARED STATEMENT

TESTIMONY OF ELISA D. HARRIS
GUEST SCHOLAR
THE BROOKINGS INSTITUTION
BEFORE THE COMMITTEE ON GOVERNMENTAL AFFAIRS
AND THE PERMANENT SUBCOMMITTEE ON INVESTIGATIONS
U.S. SENATE
FEBRUARY 9, 1989

In my testimony this morning, I will try to shed some light on the problem of the spread of chemical weapons outside NATO and the Warsaw Pact. I will begin by discussing the nature and extent of the problem, particularly which countries are believed to have chemical weapons as well as why and how they acquired their capability. I will then suggest some reasons why the international community should be concerned about chemical weapons proliferation. Finally, I will discuss how we have tried to deal with this problem in the past few years, and what we might do in the future.

THE PROBLEM

Those of us who have tried to explore the problem of chemical weapons proliferation outside NATO and the Warsaw Pact have encountered a variety of obstacles. First and foremost among them has been the reluctance of most governments to identify specific chemical weapons states. Instead, government officials speaking on the record have tended to characterize the problem in terms of the number of such states. Even these numerical estimates, however, are imprecise and somewhat contradictory.

For example, in June 1987, the head of the Soviet delegation to the Conference on Disarmament suggested that there were between 9 and 15 countries with chemical weapons. The previous year, government ministers in the United Kingdom stated that possibly more than 20 countries either had chemical weapons or were considering acquiring them. Here in the U.S., ACDA Director Kenneth Adelman said in 1987 that at least 15 states possessed chemical weapons, with others attempting to acquire them. Two weeks ago, however, his successor, Gen. William Burns, testified that while about 20 countries have a large enough chemical industry to produce militarily significant quantities of chemical warfare agents, no more than a handful of countries, five or six, actually possess stockpiles of such weapons.

A second problem we have encountered while trying to analyze the CW proliferation issue is that government officials generally do not explain how they define a chemical weapons state. Having the capacity to produce chemical warfare agents is very different from actually possessing a stockpile of chemical weapons. Moreover, a militarily useful CW capability requires more than just the weapons themselves: it also requires training and doctrine for their use. Finally, there are important differences between countries with chemical weapons under national control, and those with foreign chemical weapons deployed on their territory.

There are probably a variety of reasons why governments generally do not identify CW possessor states and are not more specific in discussing capabilities. In some cases, they may be uncertain about precisely who does in fact have what capability. After all, any country with a petrochemical, pesticide, fertilizer, or pharmaceutical industry has the potential, in terms of equipment, raw materials and technical expertise, to produce some chemical warfare agents. Governments may also remain silent in order to avoid drawing attention to chemical weapons programs acquired with the assistance, wittingly or unwittingly, of their own chemical companies. In other cases, they may have political interests that preclude them from embarassing new entrants to the chemical club. Finally, governments may fear that if they are more forthcoming with information about the chemical warfare activities of specific states, the sources of this information, and the methods by which it was acquired, might be compromised.

This brings us to our third problem, that of the credibility of the available information. The U.S. government, it must be acknowledged, has been more forthcoming than most others in terms of releasing information. But the fact remains that much of what we know about chemical weapons programs in the developing world comes from press reports citing unnamed government officials and/or what are said to be classified documents.

This credibility problem is not necessarily helped by multiple press reports containing the same basic information. One of the most detailed accounts of the proliferation issue, by Don Oberdorfer in a Washington Post story of September 1985, draws heavily from an earlier report, by the columnist Jack Anderson, purportedly based on intelligence sources and classified documents. Other press reports may also be derived from the same initial source or report. The possibility of erroneous information being unintentionally perpetuated must therefore not be overlooked.

It is also possible that false or exaggerated reports of CW proliferation may be propagated intentionally. Concern about CW proliferation can be used to increase support for national CW armament programs. CW possession or use charges also can be useful for discrediting a domestic or foreign adversary. Indeed, many of the more doubtful chemical weapons charges probably fall in this category.

In light of all of these difficulties, those of us who try to analyze this subject must be clear about the sources of our information. I do not have access to intelligence data. My conclusions, therefore, about the CW programs of specific countries are based entirely on publicly available information. I am not in a position to be able to say whether a given country has chemical weapons. The most that I can do is to try and organize the available information in a useful fashion. The specific criteria I have developed for this purpose are:

- Known CW states are those who have either declared that they possess chemical weapons or whose use of such weapons has been definitively confirmed.

- Probable CW states are those reported by NATO or Western government officials, on or off the record, as producing chemical weapons, possessing chemical weapons under national control, or using chemical weapons.
- Seeking to possess CW states are those reported by NATO or Western government officials, on or off the record, as trying to acquire chemical weapons.
- Doubtful CW states are those reported, generally by domestic or foreign adversaries, as possessing CW under national control or of using chemical weapons, with no confirmation by NATO or Western government officials.

On the basis of these criteria, Iraq is the only non-NATO/Warsaw Pact country known to possess chemical weapons. Eleven other countries, largely in the developing world, are probable CW states. The CW capabilities of eight of these countries have been mentioned in press reports citing US government officials speaking on the record. They include Burma, China, Iran, North Korea, Syria, Taiwan, Vietnam and, most recently, Libya. The three remaining countries, Egypt, Ethiopia, and Israel, have been discussed in press reports citing unnamed US government officials and classified documents. South Korea has been identified by unnamed US government officials as a country seeking to possess chemical weapons.

At least eighteen other countries have been accused of either possessing or using chemical weapons, but there has been no confirmation of these claims, either on or off the record, by NATO or Western government officials. These doubtful chemical weapons states include Afghanistan, Angola, Argentina, Chad, Chile, Cuba, El Salvador, Guatemala, India, Indonesia, Laos, Mozambique, Nicaragua, Pakistan, Peru, the Philippines, South Africa, and Thailand.

It is difficult to know with any certainty why Iraq, the eleven probable CW states, and South Korea might have decided to acquire chemical weapons. It is possible, however, to draw some tentative conclusions about the role of political and military incentives in the CW policy decisions of these countries based on publicly available information.

It would appear that none of these countries acquired chemical weapons for reasons of political prestige. In order for chemical weapons to have political value as the "poor man's weapon of mass destruction," possessor status would have to be known and acknowledged by the country concerned. Yet even Iraq did not openly acknowledge its CW activities until July 1988. Indeed, many countries have emphasized just the contrary--that they do not possess chemical weapons. Among the probable CW states that have denied possession are Burma, China, Egypt, Ethiopia, Israel, and Libya. Doubtful CW states that have denied possession include India, Indonesia, Pakistan, Peru, and the Philippines. This suggests that chemical weapons do not have the same sort of prestige value as nuclear weapons, and that decisions in the developing world to acquire chemical weapons are based largely on military rather than political incentives.

Developing countries may, in fact, view the military utility of chemical weapons differently than industrialized states. As a consequence, developing countries may have a variety of military incentives for acquiring such weapons. For example, in at least five countries chemical weapons may have been acquired for use in counter insurgency operations in their own or neighboring states. Iraq's initial decision to obtain chemical weapons may have been related to its long history of problems with its Kurdish population. Burma is said to have acquired chemical weapons to quell domestic insurgents. Egypt used chemical weapons during its intervention in the civil war in Yemen in the 1960s. Ethiopia has had a longstanding problem with Eritrean secessionists. Finally, Vietnam has been accused by the U.S. government of using the so-called yellow rain mycotoxins and other unidentified chemical agents against the Hmong in neighboring Laos and against resistance forces in Kampuchea.

Developing countries facing superior conventional forces may also have a powerful incentive for acquiring chemical weapons. Iraq's more recent chemical weapons program probably was a response to the Iranian human wave attacks in the Gulf war. The Egyptian and Syrian CW efforts may be related to Israel's conventional superiority, particularly its highly effective air force. Ethiopia may value chemical weapons for use in its longstanding conflict with Somalia over the Ogaden. Libya is reported to have acquired and used chemical weapons in its war with neighboring Chad. North Korea may have obtained chemical weapons for use against South Korean and U.S. conventional forces. Taiwan's chemical weapons are reportedly designed to thwart an invasion from mainland China. Finally, Vietnam is reported to have used chemical weapons in 1979 against Chinese intervention forces.

At least four countries in the developing world may have acquired chemical weapons in order to deter enemy chemical use through the threat of retaliation in kind. Reports that China suffered chemical attacks during border skirmishes with the Soviet Union in 1969 and during its intervention in Vietnam in 1979 suggest a strong motive for a Chinese CW program. Iran almost certainly has acquired chemical weapons in response to Iraqi CW use in the Gulf war. Israel is reported to have obtained chemical weapons in the 1970s in response to the CW threat from Egypt. South Korea's efforts to acquire chemical weapons are probably linked to the CW program of its chief rival, North Korea.

Finally, at least some developing countries may have acquired chemical weapons in part to counter an adversary's nuclear capability. Israel's alleged nuclear program, for example, may have stimulated the CW efforts of a number of Arab countries, including Iraq, Egypt, and Syria.

The CW acquisition decisions of these countries, therefore, may have reflected a variety of military incentives. These military incentives probably outweighed existing moral and legal constraints on chemical warfare which, in any event, may have weakened in recent years. CW armament programs in the developing world probably have been helped even more by the erosion of technological barriers to CW acquisition.

Countries interested in acquiring chemical weapons can either bypass the technological problems altogether by procuring such weapons from other CW states, or can seek to develop their own chemical weapons production capability by purchasing the necessary equipment and chemicals on the international market. U.S. intelligence officials have acknowledged the role of commercial firms in the CW programs of developing countries. But the United States has often emphasized the former route to proliferation, identifying Soviet training, technical assistance, and chemical weapons transfers to allies in the developing world as a key factor in the proliferation problem. In 1984, for example, columnist Jack Anderson reported that the CIA had concluded that "Soviet military assistance has been a common source and major stimulus to the momentum of chemical weapons proliferation in the Third World." General Secretary Gorbachev has denied the US charges, stating that the Soviet Union has not transfered chemical weapons to anyone, has not deployed them in the territory of other states, and "has always strictly abided by those principles in its practical policies."

Information attributed to Western government officials suggests that developing countries have benefitted from both Soviet and commercial assistance. The Soviet role almost certainly has been overstated, however, as indigenous production programs, relying largely on equipment and chemicals purchased from Western firms, have been reported for a majority of these states.

Five developing countries may have previously received chemical weapons directly from the Soviet Union. These include Egypt, Ethiopia, Libya, Syria and Vietnam. Chemical weapons and technical assistance may also have been provided by one country to another. Syria is reported to have helped the Iranian CW effort, Iran is said to have supplied chemical weapons to Libya in return for Soviet-made mines, while Israel is reported to have provided chemical agents to Taiwan, and advice on CW matters to the Chinese. A majority of these countries, however, are now said to possess indigenous chemical weapons production capabilities, often developed with equipment and chemicals purchased from Western companies. These include Iraq, Burma, China, Iran, Israel, Libya, North Korea, Syria, Taiwan, and Vietnam. Egypt may also have its own CW production capability.

A number of conclusions emerge from this discussion. First, Iraq is the only known CW state, although eleven other countries are probable CW states, and South Korea might be seeking to possess chemical weapons. The CW status of eighteen other countries is doubtful. Second, the countries that appear to have acquired chemical weapons are concentrated in two regions, the Middle East and Asia. The CW proliferation problem is thus regional rather than global in nature. Third, developing countries that have acquired chemical weapons have done so for military rather than political reasons. Finally, a majority of the countries that are reported to have acquired chemical weapons appear to have done so through indigenous production programs based on equipment and chemicals purchased from Western companies. The Soviet role in the CW proliferation problem has thus almost surely been overstated.

IMPLICATIONS

There has been much handwringing of late about the alleged Libyan chemical weapons plant, but almost no discussion of the wider implications of CW proliferation. Let me suggest a few reasons, therefore, why the international community should be concerned about the spread of chemical wepons more generally.

If chemical weapons become more fashionable, various subnational groups, including terrorists organizations, may become more interested in acquiring a CW capability. With a basic knowledge of chemistry and a small amount of money, such groups can easily produce enough chemical agent to threaten an average-size city. Research quantities of ready made agents such as mustard gas can also be purchased directly from some chemical manufacturers. Opportunities to steal chemical weapons may also increase as more and more countries acquire them. Finally, subnational groups might also obtain chemical weapons directly from states such as Libya and Iran who are sympathetic to their political aspirations.

At the national level, the spread of chemical weapons may lead to further proliferation in three ways. First, non-CW states may move to acquire chemical weapons in response to the CW threat posed by neighboring states. In addition, chemical weapons may increasingly be seen as a legitimate means of countering conventional military threats, either domestic or foreign. Finally, proliferation may lead to chemical weapons being transferred more freely between states and, hence, to further proliferation.

CW proliferation could also make conflict itself more likely, particularly in unstable regions such as the Middle East. Following confirmation of Iraq's use of chemical weapons in the Gulf war, there were reports that the United States had examined the feasibility of air strikes against Iraqi CW sites. More recently, Israel was reported to be considering a pre-emptive strike against a Syrian installation said to be developing nerve agent warheads for SS-21 and SCUD missiles. Either of these strikes could have led to a military confrontation between the countries involved.

CW proliferation could also make conflict more destructive, especially in areas such as the Middle East and Asia, where ballistic missiles are also proliferating. During the Gulf war, Iraq and Iran used conventionally armed missiles in their attacks on each other's cities. In the final months of the war, however, Iraq reportedly threatened to launch chemical strikes against large Iranian cities. At least seven other probable CW states -- China, Egypt, Israel, Libya, North Korea, Syria, and Taiwan -- also possess ballistic missiles which could be modified to carry chemical warheads. South Korea also has a conventional ballistic missile capability. The use of chemically armed ballistic missiles by any of these countries could lead to unprecedented civilian casualties. Moreover, if chemically armed ballistic missiles were used against Israel, it could even trigger a nuclear response.

The proliferation of chemical weapons, and of sophisticated delivery means like ballistic missiles, also has implications for the United States and the Soviet Union. With this type of military power in the hands of developing countries, both countries may find it increasingly difficult to pursue their regional interests. More importantly, the use of chemically armed ballistic missiles in a region like the Middle East could draw the superpowers in on the side of their respective allies, culminating in conflict between East and West, as well.

POSSIBLE SOLUTIONS

Various proposals have been put forward in recent years to deal with the problem of chemical weapons proliferation. One idea that has been pursued since 1984, when it became clear that Iraq's chemical weapons had been produced with chemicals and equipment purchased from Western chemical companies, has been that of export controls on the precursor chemicals needed to make chemical agents. The United States was the first to ban the sale to Iraq and Iran of specific chemicals that could be used to manufacture mustard and nerve gases. Other governments, including those of Australia, Canada, Japan, the Netherlands, Denmark, the Republic of Ireland, the United Kingdom, and the Federal Republic of Germany also imposed export controls on a variety of different chemicals in the spring and summer of 1984. Following reports linking a West German-made pesticide plant to Iraqi efforts to produce nerve agents, Bonn also placed controls on a wide range of equipment that could be used to produce chemical weapons. Chemical export controls were also approved by the European Community in 1984, thus providing the first multilateral response to the problem of CW proliferation. In January 1986, the Soviet Union imposed its own export controls on chemicals that could be used to make chemical warfare agents. Relevant members of the Council for Mutual Economic Assistance are reported to have met in June 1987 to discuss similar steps.

One glaring weakness in these early national non-proliferation efforts was that countries tended to include different chemicals in their export control lists. In March 1985, Secretary of State George Shultz called for multilateral as well as bilateral efforts to curb exports of chemicals that could be used to make chemical weapons. A few months later, Australia took the lead in coordinating national export control policies, hosting the first in a series of meetings of Western industrialized states.

At its first meeting in June 1985, the so-called Australian Group included the then ten member states of the European Community, plus Australia, Canada, Japan, New Zealand, and the United States. By September 1987, its membership had grown to twenty, the newcomers being Portugal, Spain, Norway, Switzerland, and the European Commission itself. Perhaps more importantly, the Group had succeeded in developing a uniform list of chemicals to be controlled by all member states. Formal export licenses are now required for eight specific chemicals, and a warning list of over thirty other chemicals has been circulated to private chemical companies in the hope that they will cooperate with government agencies in controlling the sale of these substances.

A second idea for halting the spread of chemical weapons was proposed by General Secretary Gorbachev in November 1985. Shortly before the Geneva Summit with President Reagan, Gorbachev advanced the "thought" that the two sides could develop a treaty to curb the spread of chemical weapons, just as they had concluded a treaty to halt the spread of nuclear weapons. A few months later, in a major foreign policy address, the General Secretary suggested that a chemical non-proliferation treaty be pursued as an interim step until such time as all chemical weapons were eliminated under a global ban. The United States rejected the Soviet proposal, arguing that the most effective means of halting CW proliferation was by concluding an agreement for the elimination of such weapons. As the U.S. State Department spokesman, Bernard Kalb, explained, "We believe that an effective and verifiable global ban on all chemical weapons is the way to solve the triple problems of existing chemical weapons capabilities, their use, and their further spread."

Neither the chemical export controls promoted largely by Western industrialized states nor the chemical non-proliferation treaty suggested by the Soviet Union will solve the CW proliferation problem. Export control policies will not prevent countries that already possess civil chemical industries from developing at least some chemical warfare agents. Moreover, it is impossible to control all of the chemicals that could be used to produce chemical warfare agents, as many have legitimate commercial uses. Finally, a determined state may be able to evade export controls entirely, either by setting up front companies, or by dealing with unscrupulous chemical traders or manufacturers. Chemical export controls will not, therefore, prevent a country that really wants chemical weapons from acquiring them. At best, export controls will make it more difficult and costly for the potential proliferator to acquire chemical weapons and may provide supplier countries with early warning of such proliferation.

Verification problems and, more importantly, political obstacles rule out a chemical non-proliferation treaty as a solution to the problem of CW proliferation. Developing countries oppose the creation of another discriminatory, Nuclear Nonproliferation Treaty-type of arrangement, which would allow existing members of the chemical club to retain their chemical weapons, but would prohibit the "have-nots" from acquiring them. Western countries view efforts to conclude such an agreement as a distraction from the negotiations in Geneva aimed at banning chemical weapons. As the U.S. ambassador to the Geneva negotiations, Donald Lowitz, explained in 1986: "the focus of our efforts is and must remain a comprehensive agreement that eliminates forever the scourge of these terrible weapons."

In my view, the Reagan administration was correct in its assessment that the best potential solution to the problem of chemical weapons proliferation is a chemical weapons ban. Verifying compliance with such a treaty will not be easy. It is, however, possible. The real challenge, though, will be to convince developing countries that have acquired chemical weapons that their security interests can be met by a chemical disarmament treaty. For, as the

British Foreign Secretary, Sir Geoffrey Howe, told the third UN special session on disarmament in June 1988, "disarmament cannot proceed in a vacuum.... It is inextricably tied up with security. No one is going to discuss disarmament seriously if he already feels insecure."

The United States has a clear interest in halting the spread of chemical weapons in the developing world. Although the identities and capabilities of CW possessor states may still be unclear, Iraq's acquisition and repeated use of chemical weapons provides firm evidence of a CW proliferation problem. Chemical export controls are of limited value in preventing developing countries from acquiring CW production capabilities. A ban on chemical weapons could go a long way toward solving the proliferation problem, but only if all existing CW states can be convinced that their security interests can be met by means other than chemical weapons. If countries like Iraq refuse to participate in the chemical weapons ban, the treaty's non-proliferation objectives will not be realized, and other countries may not agree to ratification. CW proliferation in the developing world may thus make the elimination of chemical weapons both more urgent and, at the same time, more difficult to achieve.

Testimony of W. Seth Carus,
Fellow, Washington Institute for Near East Policy,
Before the

Committee on Governmental Affairs
February 9, 1989

It is an honor to be asked to testify before this committee. There are few subjects more important today than the proliferation of chemical and biological weapons. Mr. Chairman, I request that my full statement and the Washington Institute's Policy Focus be submitted for the record.

CHEMICAL PROLIFERATION IN THE MIDDLE EAST

I would like to start by summarizing the current situation in the Middle East. Unfortunately, the news is mostly bad. The genie is out of the bottle. Not only is there little prospect of getting it back in the bottle, but in the absence of effective containment policies the situation is likely to get worse before it gets better.

Six countries in the Middle East have the capability to use chemical weapons. The list includes Egypt, Israel, Syria, Iraq, Iran, and Libya. Four of these countries have made use of chemical weapons: Iraq, Iran, Libya, and Egypt. The first three countries, which also have been involved in state-sponsored terrorism, used chemical agents in the past few years.

The Egyptians were the first in the Middle East to acquire chemical agents. During the 1960s they appear to have possessed stocks of mustard gas and phosgene, and may have had nerve agents as well. By the early 1970s they had a well-developed chemical warfare capability. They have continued to work on chemical weapons since then. The Egyptians used chemical agents in North Yemen between 1963 and 1967 in attacks aimed at villages. They did not use chemical weapons against Israel during the 1967 or 1973 wars.

The Israelis appear to have acquired chemical agents in response to the Egyptian use of such weapons. Their program was in place by 1973, when they are known to have had an offensive chemical attack capability. Currently, it is believed that they have a reasonably sophisticated chemical weapons program that includes production of nerve agents. Israel has never used chemical weapons. The Israelis have never publicly admitted that they have chemical weapons, and they have never threatened to use chemical agents.

The Iraqis initiated efforts to acquire chemical agent production facilities in the mid 1970s. By the early 1980s, with the active assistance of companies from industrialized countries, but especially from West Germany, they built facilities able to produce up to 1,000 tons of chemical agent a year. The United States was able to interfere to some extent with Iraqi production, by preventing exports of precursor chemicals and by working with European countries to do the same. However, as recent disclosures of sales of chemical precursors from the United States to Iraq indicate, Baghdad is still able to obtain the necessary raw materials that it needs. In addition, the Iraqis are now believed to manufacture some of the precursor chemicals required to make agents.

Iraq employed poison gas against the Iranians and Kurds extensively during the recent hostilities. These attacks culminated in a series of vicious attacks against targets inhabited mainly by Kurdish civilians. Iranian statistics suggest that as many as 50,000 people were killed or wounded by Iraqi chemical attacks. Although these figures may be exaggerated, it is quite clear that a great many people were killed and wounded by Iraqi chemical agents.

Little is known of the Syrian chemical program. By the mid-1980s it was known that the Syrians were producing chemical agents, including nerve gas. It is also known that the Syrians have acquired several dozen chemical warheads for their ballistic missiles. Some experts believe that Syria may have the most sophisticated program in the region.

It is generally believed that the Syrian facilities were built with the assistance of companies from the industrialized world. At least one West German company is known to have provided equipment to the Syrians. The Syrians have never used chemical agents.

Iran only started acquiring and producing chemical agents in response to the Iraqi use of chemicals in the Gulf War. Iran's first stocks of chemicals appear to have come from the Iraqis, drawn out of unexploded Iraqi bombs. However, it now appears that the Iranians are developing production facilities for a number of chemical agents. The Iranians may have obtained much of their chemical precursors from West Germany. Iran is believed to have used chemical agents on a number of occasions during the Gulf War.

The Libyans are the most recent addition to the list of countries possessing chemical weapons capabilities. They have built a massive plant at Rabta with the potential to make between 3,600 and 12,000 tons of mustard gas and nerve agent every year. As is now well known, this facility was built by individuals and companies from the industrialized world, including but not limited to some located in West Germany and Japan. Libya is believed to have mounted gas attacks during the hostilities in Chad. Fortunately, these operations do not appear to have inflicted any losses.

There is some concern that other countries in the region may be interested in acquiring chemical agents as well. It has been reported that Libya may have transferred chemical agents to Somalia. At the same time, there appears to be concern in the United States that Saudi Arabia may be looking into acquiring chemical weapons. Other countries also have been mentioned as possible recipients of chemical weapons, but such reports are of dubious reliability.

At the present time, chemical weapons are firmly entrenched in the Middle East. Additional proliferation is still possible, since the pressures to acquire poison gas remains. Unfortunately, as time passes our ability to bring these developments under control may diminish. Countries in the region are acquiring the ability to make precursor chemicals, making them less vulnerable to export controls from the industrialized world.

THE CONSEQUENCES OF PROLIFERATION

The main problem at the moment is the willingness of countries to use chemical weapons. The Iraqis demonstrated that it was possible to use chemical weapons and get away with it. The international reaction to Iraq's flagrant violation of the 1925 Geneva Protocols banning first use of chemical weapons was muted at best. Moreover, the Iraqis appear to have demonstrated that chemical weapons have some utility when they are used. Although many experts believe that the military value of chemical weapons was not as great as sometimes asserted, it is quite evident that in many countries in the Middle East it is believed that chemical weapons have become a necessary component of the national arsenal.

Unfortunately, international agreements have proven to be an ineffective barrier. Every country that has used chemical agents in the Middle East is a signatory to the 1925 Geneva Protocols prohibiting first use of chemical weapons.

There is reason to fear that chemical weapons will be used in future conflicts in the region. The Iraqis have made it clear that they will make use of any weapon at their disposal, should they so chose, and that they will not allow international agreements or pressure to stand in their way. In addition, we cannot trust the Libyans to show any restraint in the use of chemical weapons.

Although Israel might be the intended target of many Arab chemical programs, the Israelis are better able to cope with the threat than any other country in the region. Because of Israel's high sensitivity to casualties and because of the symbolism of poison gas being used to kill Jews, Israel has taken the steps needed to minimize its vulnerability to chemical weapons. It has acquired chemical defenses for soldiers and civilians, it possesses a chemical retaliatory capability, and has articulated a retaliatory policy against those who use chemicals against it. Thus, while Israel is justified to be concerned about chemical threats, it is capable of dealing with such a challenge.

BIOLOGICAL WEAPONS

Our failure to stop the use of chemical weapons may have even more ominous implications. Countries in the Middle East are moving into biological weapons development. Perhaps six of the ten or eleven countries around the world believed to be developing biological warfare capabilities are in the Middle East. Although recent attention has focused on the Iraqi program, Iran, Egypt, Israel, Libya, and Syria have biological warfare programs.

The willingness of countries in the region to use chemical weapons suggest that they would be willing to employ biological agents as well. Unfortunately, the technical capabilities of these countries is growing, and we should not be surprised to discover that these countries are able to exploit innovations in biotechnology in their programs.

DELIVERY SYSTEMS

In the Middle East, the acquisition of chemical weapons has gone hand in hand with efforts to obtain weapons systems capable of delivering agents over long distances. Of greatest concern is the proliferation of ballistic missiles, but in some cases aerial refueling systems are also believed to be connected to chemical weapons programs.

Several countries in the region have programs to put chemical warheads on ballistic missiles. During the mid-1980s the Syrians developed chemical warheads for their SCUD missiles, probably with outside assistance. It is believed that they now may have several dozen of these warheads. Iran and Iraq also are believed to be working on chemical warheads for their ballistic missiles. The Iraqis may be intending to put warheads on their 650-kilometer range Al-Husayn missiles or on their 900-kilometer range Al-Abbas missiles. Either of these missiles are capable to hitting targets from Tehran to Tel Aviv. Iraqi missile developments has been made possible, in part, by West German companies, reportedly to include a subsidiary of the large defense firm MBB.

The Libyans are reported to have a program to place chemical warheads on their SCUD missiles. In addition, it is believed that the Condor missile being developed jointly by Egypt and Argentina with Iraqi support may be fitted with chemical weapons. It is generally believed that West German assistance, originating with the firm of MBB, plays a critical role in the development of the Condor.

In this context, Libyan efforts to modify their Mirage F-1 and MiG-23 fighters so that they can be refueled in the air must be viewed with considerable alarm. The Libyans have desired for a considerable period of time to be able to strike Israel. It is probably not a coincidence that Libyan acquisition of aerial refueling technology, obtained from a West German firm, is taking place at the same time that the chemical weapons facility at Rabta is being built.

WESTERN COMPANIES AND CHEMICAL WEAPONS

An important part of the bad news about chemical proliferation in the Middle East is the involvement of some of our closest allies. The ability of countries in the Middle East to acquire chemical weapons is largely due to the support provided by companies in the industrialized world, and especially in Western Europe and Japan. Without the technical assistance, equipment, and precursor chemicals provided by experts and companies in the West, it would not have been possible for Iraq, Libya, or Syria to acquire chemical weapons capabilities.

Unfortunately, it appears that this behavior has been tacitly condoned by many of our allies. All too often, governments have looked the other way when it was evident that their nationals were involved in the traffic in chemical weapons technology. The implicit message that this has given to the Iraqis is that the opposition of industrialized countries to the spread of chemical weapons is superficial at best.

The worst offenders have been the West Germans. At the same time that they their government was actively promoting a convention to ban the production of chemical weapons, West German companies were actively involved in the creation of chemical weapons production facilities in Iraq, Libya, and Syria. Although the West Germans will acknowledge that some of their companies may have been profiting from involvement in such activities, their defense has been that their laws do not allow them to interfere in this activity.

It has been more than five years since the United States identified the West German companies that helped Iraq build its chemical weapons production facility at Samarra. Yet, the West Germans never made any effort to change their laws to prevent another such incident. If they had wanted to correct the deficiencies in their laws, they had plenty of opportunities.

Unfortunately, it is clear that they were not willing to do so. They were content to posture as advocates of chemical weapons bans even as they made possible chemical weapons production in the Middle East.

The vehemence of the West German government's response to the revelations concerning the involvement of West German companies in the construction of the Libyan plant suggests why it is so difficult to control the proliferation of chemical weapons. The United States had hard evidence. The West Germans knew that we had the evidence, and we knew that they knew we had it. Nevertheless, they were willing to accuse the United States of mounting a smear campaign against their country. It almost seems as if their right to export chemical weapons production capabilities was more important to them then their relations with the United States. Certainly this was extraordinary event that surely deserves some attention from analysts of German-American relations.

It appears that the West Germans have finally decided to change their laws to tighten up control of exports. However, we must wait and see if they are really serious about it. It will be some time before we know for sure that true progress has been made. Unfortunately, companies and individuals from other countries also are involved in the proliferation of chemical weapons.

Rather than adopting sanctions against countries using chemical weapons, the usual reaction is to look the other way.

Worse, even some of our closest allies have decided to profit from the desire of countries in the Middle East to make chemical weapons.

OPTIONS FOR THE FUTURE

Given all the bad news, what options are available to the United States to ameliorate the situation? There is something the United States can do, and it involves legislating sanctions. These sanctions should be aimed at countries that use chemical agents and at companies that assist in the proliferation of chemical weapons production.

To understand the importance of sanctions, we must come to grips with certain basic realities. First, there is no reason to believe that countries in the Middle East will be willing to give up their chemical weapons in the foreseeable future. Motivations vary from country to country, but the bottom line is the same: there are many reasons to possess such weapons and few reasons to give them up.

Second, the United States wait for the cooperation of our allies in efforts to bring the problem under control. Proliferation of chemical weapons in the Middle East was made possible by the active support of companies throughout the industrialized world. Although our friends are willing to pay lip service in support of efforts to contain chemical weapons proliferation, all too often they look the other way when their nationals are busy helping build chemical agent production facilities. Hence, if anything is to be accomplished, the United States is going to have to act alone without expectation of immediate international support. Relying on consensus, even in the context of our closest allies, is a prescription for accomplishing nothing. Once we take a strong stand, it is likely that others may be willing to follow our lead and take a similar stand.

Keeping these two principles in mind, the primary aim of United States policy towards the region should be to promote stability. The primary focus should be on steps that reduce the chances that chemical weapons will be used. Although it may be desireable to eliminate chemical arsenals in the Middle East, we must first convince people in the region that it is too costly to make use of chemical weapons.

It is not going to be easy to accomplish even this basic objective. Certainly, we must recognize that the negotiations in Geneva aimed at eliminating chemical weapons will have little impact on developments in the Middle East. Thus, our policy needs to focus on some more narrowly conceived objectives.

The core of any policy should be legislated sanctions against countries that employ chemical agents in violation of the Geneva Protocols. By notifying countries in the region now that the United States will react strongly to punish countries that employ chemical agents, we will raise the potential costs of using such weapons. Although this might not stop countries from using chemical weapons, it will at the very least affect the balance of costs and benefits.

In addition, we should implement strategies intended to support our allies in the region. The United States should make it clear that we will provide an appropriate military response to the use of chemical weapons against our allies. As an example, if Libya were to use chemical agents once again, we should seriously consider, as an appropriate response, an attack on the facility at Rabta.

As a part of this policy, the United States should enhance efforts to slow down the pace of proliferation. Accomplishing this will not be easy, but some positive steps can be taken. We should implement sanctions against companies that knowingly help in the production of chemical weapons. Crucial in this process is naming names. This is essential if we are to convince allied governments to take action against guilty companies. Moreover, it is important that those involved in the process learn that their activities will be exposed, and that they will be identified as pariahs.

Finally, we also need to focus on delivery systems. Efforts to stem the proliferation of ballistic missile technology are essential. This can be done in many ways. Adoption of the Missile Technology Control Regime was a useful first step, but additional action is needed. Vigorous bilateral diplomacy also is essential.

If we act forcefully, it is possible that we can reduce the chances of chemical weapons being used again. Moreover, we may be able to lay the ground work that will permit adoption of arms control measures in the future. Thus, there is reason for hope, but only if we take the necessary steps.

Chemical and Biological Weapons: New Technologies and the Prospect for Negotiations

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New technology is a relative concept in the field of chemical and biological warfare (CBW). Unlike nuclear weapons whose significance for conflict is measured in decades, biological weapons date back millennia and chemical weapons at least a century. The march of technological change over this time in the chemical and biological sciences has stimulated the episodic transformation of the implements of war. Those weapons have also been shaped by an ever-changing military and international political context.

The complex relationship between technology and arms control is also vividly demonstrated in the CBW field. Efforts to construct an arms control regime date back nearly 100 years. The widespread chemical warfare of World War I gave rise to the relatively stable but fragile arms control regime embodied in the 1925 Geneva Protocol. Efforts to update and expand this regime are ongoing as are efforts to explore and adapt modern chemical and biological sciences to military purposes.

By drawing on this experience, we can begin to formulate some tentative insights into the basic relationships among changing weapons technology, arms control, and national security. Can international agreements prevent destabilizing technological changes? Or must arms control measures inevitably be swept aside by technological change? Is security enhanced by changing technology? How closely should we equate an imperfect arms control regime with national security? Will specific technological changes predicted in the area of CBW contribute to enhanced international stability or are we headed toward a world in which chemical and biological weapons proliferate and are used more frequently?

The Chemistry of War - The Technical Dimension

Both chemical and biological weapons cause damage to living organisms through physiological effects rather than through direct physical impact from blast or heat. Both affect primarily living organisms (i.e., they are biospecific) and do little damage to physical structures. But chemical weapons are not biological weapons and the differences between the two are essential to the discussion that follows. Chemical agents of warfare are chemical substances, whether gaseous, liquid, or solid, which might be employed because of their direct toxic effect. Biological agents of warfare are living organisms, or infective material derived from them, which are intended to cause disease or death and which depend for their effect on their ability to multiply in the organism attacked. Toxins are chemical substances produced by living organisms but not themselves living.[1]

Chemical agents are generally categorized as either incapacitating or lethal. Incapacitating agents temporarily impair the ability of a person to function effectively. These agents are divided into physiochemical and psychochemical types, the former causing severe irritation or paralysis and the latter causing mental disorientation. Lethal agents are divided into four types: blister agents (vesicants such as mustard gas), blood gases (that interfere with cell respiration), lung irritants (that injure respiratory tissues), and nerve agents (that impair the body's ability to regular muscle action, causing uncontrollable muscular activity which leads to death through respiratory failure).

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[1] For a more complete description, see Stockholm International Peace Research Institute (SIPRI), The Problem of Chemical and Biological Weapons, v. II. (Stockholm: 1973).

The first modern chemical weapons were used extensively in World War I. These were essentially industrial chemicals such as chlorine. The more lethal nerve agents were developed during the 1930s as a result of commercial work on insecticides. This first generation of nerve agents (called G agents) work primarily through inhalation. Included within this group are the agents Tabun (GA) and Sarin (GB). A second generation of nerve agents--V agents--were developed during the 1950s. Their effects occur primarily by absorption through the skin. A principle measure of differentiation among nerve agents is their relative persistence, which is a measure of the susceptibility of chemical agents to degradation owing to the effects of exposure to wind, sun, rain, and other climatological factors. Some retain their toxic effect for hours, others for days.

Since the development of V agents in the 1950s, there has been relatively little change in the science of agents of chemical warfare. There is, however, growing concern that a new generation of toxins (defined above as chemical agents derived from living material) may be a by-product of the biotechnology revolution, though this is a problem that has yet to come into sharp focus.

In the area of delivery systems as well, technological change has been modest. By the end of World War I, chemical agents were being delivered in artillery shells. This continues to be the principal mode of delivery. Spray tanks, bombs, land mines, mortars, and battlefield rockets containing chemical agents have also been developed. Some countries have explored missile technology for chemical warhead delivery including short- and long-range ballistic missiles as well as cruise missiles.

In the 1950s the United States began development of a safer but more complex chemical munition technology. This technology is designed to store separately two chemical precursors so that the nerve agent is not actually created until the weapon is in flight to its target. The resultant weapons are termed binary weapons (since the ingredients are in two parts); their predecessors are termed unitary weapons. Binary munitions disperse G or V agents and not, as some have alleged, a new and more toxic generation of nerve agent. The binary technology was refined during the 1960s and a binary artillery shell was put into production in late 1987 (with the cessation of the chemical weapons production moratorium by the United States that began in 1969). A binary bomb called Bigeye has experienced developmental problems but low scale production has been funded and is expected in 1990. A chemical munition for the Multiple Launch Rocket System (MLRS) is moving into full-scale development and production monies may be sought in Fiscal Year 1991. Roughly speaking, each of these systems is an updated version of chemical delivery systems previously stockpiled by the United States.

Changing Perceptions of Military Utility?

What is the place of chemical weaponry in modern armed conflict? How might changing technologies influence perceptions of the military utility of such weaponry? Answers to these questions depend very much on which nation's military is asking and in what circumstances. There is a great danger that our thinking about these questions is constrained by mirror-imaging, i.e., the tendency to attribute our assumptions and perceptions to others.

Concerning the perspective of chemical warfare specialists in the armed forces of the United States, the most that can be said is that chemical weapons have an uncertain military value except in very limited circumstances. Based on its reading of World War I and subsequent technological developments, the U.S. military has concluded that chemical weapons are unpredictable on the battlefield, cumbersome to use, and disruptive of one's own combat operations. The disadvantages of chemical warfare are particularly evident in a NATO-Warsaw Pact conflict in central Europe, where chemical weapons stand out as ill-suited to the defensive character of NATO strategy and as likely to inflict large numbers of civilian casualties. The disadvantages of chemical warfare may be less evident in military theaters outside Europe, though the attention of the U.S. military to such contingencies is generally quite low.

To the extent that the U.S. military sees any utility in chemical munitions it is in imposing the burdens of chemical use on the initiator of chemical warfare. Their utility derives, then, not from their direct toxic effect but from the cumbersome defensive measures that must be taken by a military force expecting to fight in a chemically contaminated environment. In short, the U.S. military sees the principal purpose of a chemical arsenal as deterrent rather than war-fighting. It sees the maintenance of a chemical deterrent as well-suited to NATO's flexible response strategy and the panoply of deterrence and escalatory forces it envisions in time of conflict in Europe. Some Europeans, however, question the role of a CW capability in Western deterrence, arguing that it diminishes the certainty of nuclear escalation by the United States in favor of measures limiting the war to Europe.

The efficacy of this deterrent effect is supported by historical experience since World War I--no nation possessing a chemical arsenal has been attacked with chemical weapons since that time. But the lessons of history are not always as clear or permanent as some would wish. The history of chemical deterrence is instructive but only if read somewhat guardedly--the future may look quite different.[2]

Consonant with this reading of the military utility of chemical weapons, the United States possesses a stockpile of chemical weapons under a doctrine of no-first-use as well as relatively robust chemical defensive capabilities. The United States defines the size of its stockpile as "modest." During the 1950s and 1960s the United States built a stockpile of munitions deemed sufficiently large and diverse to meet perceived military needs. It ceased production in 1969. The binary production program begun in late 1987 is intended to replace the existing stockpile with one smaller in size but more militarily potent.

The credibility of this deterrent strategy is a subject of debate. A formal NATO chemical strategy does not in fact exist. It is an assumption about how things might work under flexible response. NATO command has no chemical weapons at its direct disposal and no agreed doctrine for their use. Furthermore, nearly half of NATO's members have not reserved for themselves under the Geneva Protocol the right to use chemical weapons in retaliation (Denmark, Greece, Iceland, Italy, Luxembourg, Norway, and Turkey). Former Supreme Allied Commander, Europe, General Bernard Rogers has repeatedly and vocally urged the alliance to focus on the question of its response in the event of chemical attack.

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[2] For an historical analysis of chemical deterrence, see Frederic J. Brown, Chemical Warfare: A Study in Restraints (Greenwood Press, Westport, 1968), and John Ellis van Courtland Moon, "Chemical Weapons and Deterrence: The World War II Experience", International Security, 8:4 (Spring 1984), 3-35.

To what extent has technological change affected U.S. perceptions of the military utility of chemical weapons or changed operational concepts? Probably not very significantly.

Binary technology does diminish some of the constraints on U.S. chemical warfare options--binary munitions are safer to build, store, and transport. But binary munitions are still not easily assimilated into U.S. military practice or easily used in time of war. Furthermore, the delivery system technology has not changed the central problems of battlefield unpredictability. The decision to produce binary weapons was not made simply because a more advanced technology became available; rather renewed production came to be perceived as necessary for the maintenance of deterrence and as a useful bargaining chip in the disarmament negotiations.[3]

But this is not to argue that U.S. chemical weapons production is not without implications in terms of a possible future rethinking of the operational framework. One implication relates to the growing ability--and compulsion--to strike deep in a European war. A NATO ability to project chemical warfare into Eastern Europe and the Soviet Union would mean a widening of chemical conflict beyond the forward edge of the battle. Some analysts distinguish between a "defensive chemical deterrent" and an "offensive chemical deterrent" and argue that the United

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[3] "Report of the Chemical Warfare Review Commission," U.S. Government Printing Office, June 1985. See particularly Part II.

States is moving in the direction of the latter with its longer-range delivery systems, i.e., the Bigeye bomb and MLRS. If limited chemical retaliation does not deprive the initial attack of its advantages and chemical war becomes widespread, the deterrent function of Western chemical munitions will have disappeared. Worse yet, the massively destructive effects of chemical warfare will spread through civilian populations across Europe--with horrendous and immediate effect.

A second implication stems from the plan to arm the navy with chemical munitions. The deterrent function of U.S. chemical weapons is not particularly convincing in Third World contingencies not involving a direct conflict between the United States and the Soviet Union or their allies. For example, were U.S. naval ships in the Persian Gulf to be attacked with chemical weapons, U.S. chemical retaliation intended to force attacking military forces into chemical protective gear could hardly be seen to deter further attack. Instead, U.S. escalation dominance in terms of its overall conventional capabilities and credible ship-board chemical defenses would seem to be more essential to chemical deterrence. Furthermore, the dispersal of chemical munitions aboard U.S. naval ships risks stimulating the problem of chemical proliferation, invites a further politicization of the issues of overseas basing and port access, and offers little clear advantage in chemical deterrence.

Soviet perceptions of the military utility of chemical weapons may well differ from those of the United States. There is an extensive debate within the Western policy community about both Soviet chemical warfighting capabilities and Soviet intent. This debate has obscured the wide areas of agreement on the subject among analysts.

There is a relatively high degree of consensus about Soviet chemical warfighting capabilities. Defensively, the USSR has a formidable (though not invincible) ability to operate on a contaminated battlefield. Offensively, it possesses a variety of agents and delivery systems in sufficient quantities for extended use (although exact numbers are unclear) and with the ability to do so. Little is known about Soviet research and development in the chemical area, though there is some worrisome speculation about research on defense-defeating agents and such other developments as effective self-antidotes.

There is more disagreement and less knowledge about Soviet intentions vis-a-vis this capability. It is likely that the way in which the Soviets contemplate chemical weapons use fluctuates along with their perceptions of changes in the battlefield environment, relevant technologies, Western capabilities, the nuclear balance, and a variety of other matters. It is therefore dangerous to impose Western views about the utility of chemical weapons onto the Soviets. At times chemical weapons probably have played a major role in Soviet conceptions of a non-nuclear war in Europe. Growing Soviet nuclear capabilities may have diminished the importance of chemical weapons. Their importance has not been eliminated, however, and may well have grown with regard to long-range selective use.[4]

Two scenarios stand out as relevant to thinking about the Soviet/Warsaw Pact use of chemical weapons. The first is the not-unreasonable scenario depicted in Tom Clancy's novel Red Storm Rising--Soviet strategic deception at the outset of conflict in Europe in order to prolong the impression that Soviet military action is defensive, morally justified by Western provocation, and deserving of international support. Soviet chemical first-use would contrast with the essential image and therefore would be unlikely. On the other hand, chemical war might also start through an act of chemical deception; the Iraqis are alleged to have faked (and indeed perhaps to have inflicted) chemical attack on their troops so as to justify their own use of chemical weapons.

The second scenario is closer to conventional wisdom--a Soviet blitzkrieg against NATO paced by the need to prevent NATO nuclear response and to create a fait accompli before NATO has mobilized a conventional response. In this scenario, chemical weapons could have an early and decisive effect. Studies have shown the ways in which Soviet chemical use could contribute to this goal.[5] Soviet chemical attack would likely focus on static targets in NATO's rear. Non-persistent agents would be applied to areas to be occupied by Warsaw Pact forces; persistent agents would be used to deny staging and transport areas to NATO, to interdict the movements of goods and manpower, and to disrupt command, control, and communications, especially of nuclear assets.

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[4] For a discussion of the place of chemical weapons in Soviet military doctrine see Enrico Jacchia, ed., Chemical Warfare in Soviet Military Doctrine, (Rome: Centro di Studi Strategici, 1985). See also C.N. Donnelly, Heirs of Clausewitz: Change and Continuity in the Soviet War Machine, (London: Institute for European Defence & Strategic Studies, 1985), Occasional Paper, No. 16.

It is thus the overall disruptive effect of chemical attack in terms of the reduced efficiency of NATO forces operating in a defensive posture, especially in one-sided chemical warfare, that is the principal measure of the military efficacy of Soviet chemical weapons. For example, Soviet chemical attack on Western airbases could help them contend with two of NATO's great strengths--air superiority and air delivered nuclear assets--since the NATO sortie rate would drop at least 80 percent (SACEUR's calculation). It could slow mobilization, help bring about the political collapse of NATO, and preempt the use of nuclear weapons. Chemical attack would also panic Western publics, sparing the Warsaw Pact the task of fighting through densely populated urban areas and contributing to confusion in the NATO rear.

In sum, Soviet/Warsaw Pact chemical first-use could be well-suited to current operational concepts as we understand them: the use of surprise, the control of tempo and initiative, flexibility along an amorphous front, and preservation of Western infrastructure.

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[5] Chemical Warfare Study: Summary Report (Alexandria, Va.: Institute for Defense Analyses Paper P 1820, February 1985).

Obviously, Soviet operational concepts are subject to change, particularly in the dynamic Gorbachev era. The Pentagon has indicated some shifts in Soviet thinking about the role of chemical weapons in European conflict. The long-standing assumption that a surprise Soviet attack would begin with massed chemical attack has given way to an expectation that chemical use would be more selective and limited. But a recent Presidential Chemical Warfare Review Commission pointed out that this is not cause for relief:

> "That change to a more modern doctrine is not encouraging, however. It represents a Soviet conclusion that its attacking forces would be best served by limiting chemical use to key areas, so that they can fight unencumbered elsewhere. More importantly, it suggests that Soviet chemical attacks are planned to be sufficiently discrete in area and target that Western political authorities, unless they had sufficient chemical retaliatory capability, would be likely to hesitate before turning to nuclear arms as a response. As officials of one European government pointed out to the Commission, the new doctrine makes Soviet use of chemical weapons more, rather than less, likely."[6]

The Soviet first-use of chemical weapons is by no means certain, even if this reading of their operational concepts is largely correct. Disincentives remain. One is the escalatory potential of chemical use. The NATO threat to escalate under flexible response may have lost some of its credibility since the late 1960s, but enough doubt must remain to create uncertainty in the minds of Soviet political leaders that if Soviet chemical weapons are used to decisive effect a Western nuclear response may be possible. A second constraint is simply the complexity of chemical warfare. If the Soviets are compelled to move quickly in a surprise blitzkrieg and to maintain a rapid tempo, the logistical and operational burdens of chemical usage could add a layer of complexity out of proportion to the military benefit and risk. This observation is especially true if the Soviets anticipate chemical retaliation.

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[6] "Report of the Chemical Warfare Review Commission," 28.

The INF treaty and the force reductions it obliges are likely to influence Soviet thinking about chemical warfare in Europe. No one has disputed that in the wake of the INF reductions the USSR will retain sufficient numbers of launchers to ensure the kind of target coverage of NATO assets that it desires. The question now is how to allocate what kinds of warheads over a smaller number of launchers. The Soviets will have to make a choice about the importance of chemical warheads in the warhead mix.

An assessment with mirror-images of U.S. and Soviet perceptions would stop here. But some have argued that Soviet thinking has carried the military utility of chemical weapons into other forms of conflict.[7] It is generally accepted that Soviet doctrine calls for the extensive use of covert operations by spetsnaz (special operations) forces to disrupt Western military decision-making assets and to preempt Western action. By and large, these assets are quite vulnerable to chemical attack by special forces.

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[7] Joseph D. Douglass, Jr., and Neil C. Livingstone, America the Vulnerable: The Threat of Chemical and Biological Warfare, (Lexington, Ma.: Lexington Books, 1987).

In sum, to the extent that we can say with confidence anything about Soviet perceptions of the military utility of chemical weapons, it is that those perceptions are not driven so much by changing technology as by a careful reading of operational imperatives and military history. Since those differ from those of the West, it is not surprising that the perceptions of military utility may differ as well.

In the late 1980s a discussion of the military role of chemical weapons cannot stop with the superpowers. Chemical weapons have a growing appeal in the Third World. At the beginning of this decade, conventional wisdom had it that only three to five countries possessed chemical weapons. Today, estimates range from 15 to 30 countries that either possess or are actively working to possess a chemical arsenal.[8] In September 1988, a Pentagon official pegged the number at 22.[9] Clearly, many of our concepts of military utility derive from a Eurocentric, modern armored force perspective, likely to be of little or no relevance to the perspectives of others. What accounts for the growing appeal of chemical weapons in the Third

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[8] Lois R. Ember, "Worldwide Spread of Chemical Arms Receiving Increased Attention," in Chemical & Engineering News, April 14, 1986, 8-16.

[9] Information supplied by Thomas Welch, Deputy Assistant Secretary of Defense (Chemical Matters), on September 12, 1988.

World?

First, chemical weapons can assume a more nearly strategic role (as opposed to a tactical one) in the Third World. The use of chemical weapons against an undefended opponent could turn the tide of a conflict, whether defensively, in terms of preventing an opponent from massing armies, or offensively, in terms of threatening a small country's political, economic, cultural, and historical identity centered in one urban center. This kind of scenario has earned chemical weapons the title of the "poor man's nuclear bomb."

Second, the construction of chemical arsenals might serve as a half-way house for those Third World states seeking a nuclear capability. The existence of a chemical arsenal might "legitimize" the deployment of delivery, C^3I (command, control, communications, and intelligence), and defensive systems upon which a subsequent nuclear capability might easily be grafted.

Third, many of the constraints on military utility that operate on the modern European battlefield may not be relevant in the Third World. Battlefield unpredictability, for example, may be less important where armed forces or neighboring populations may not be so highly concentrated geographically. In addition, little or no defensive gear would be available. Furthermore, chemical weapons might be perceived by some to have a special utility in counterinsurgency warfare.

The potential import of chemical weapons in military conflicts in the developing world has been demonstrated by the

Iran-Iraq war. Two United Nations investigations have confirmed the use of chemical weapons in that war. Iraq was long seen to be the guilty party, and in early 1988 admitted the use of such weapons. The United States maintains that there has also been some evidence of limited use by Iran. The experience is relevant for three reasons. First, the use of chemical weapons by Iraq appears to have been critical to the successful prosecution of its military strategy, a matter that is likely to incite chemical weapons proliferation. Second, the weapons used in the conflict appear to have been produced domestically, underscoring the ease of access of Third World militaries to this type of capability. Third, international public opinion and the pious outcry of government spokesmen appear to have been of little consequence to Iraqi decision-makers, thus eroding a key component of the existing arms control regime--i.e., the political costs of chemical use.

To what extent have Third World perceptions of the military utility of chemical weapons been shaped by technological change? The chemical proliferation problem is only tangentially a problem of technological change per se; rather, it is the increasing internationalization of the chemical industry, and the trade in goods and expertise that go along with it, that has put chemical arsenals within the reach of militaries outside of the East-West context. It is more a question of technological availability than technological change.[10]

The Chemical Arms Control Regime

An international legal regime for the control of chemical weapons is partially in place. International efforts to create legal restraints on the use of such weapons date back to the Hague conferences of 1899 and 1907, which proscribed the use of chemical weapons in war. Other components of the arms control regime include a number of peace treaties after the two world wars which forbade the losers of those wars from having chemical weapons. Additionally, the United Nations has passed a resolution which requires of all states that they look upon these components of the law as constituting a customary international law.

The cornerstone of the regime is the Geneva Protocol of 1925, to which more than 115 states are now bound. The states negotiating the protocol in the 1920s did not believe that it was possible to negotiate effective compliance and verification measures, so the convention permits states to produce and stockpile chemical weapons.[11] The agreement emerged simply as an undertaking not to use those weapons, and about half of the states who have acceded to its terms have done so under the condition that they retain the right to use chemical weapons if others use them first.

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[10] Binary Weapons: Implications of the U.S. Chemical Stockpile Modernization Program for Chemical Weapons Proliferation, Subcommittee on International Security and Scientific Affairs of the Committee on Foreign Affairs, April 24, 1984; 98th Cong., 2d sess.

[11] For an authoritative analysis of the use of chemical weapons in World War I and their aftermath, see L.F. Haber, The Poisonous Cloud: Chemical Warfare in the First World War, (Oxford: Clarendon Press, 1986).

These agreements are important components of international processes that have worked to hinder the spread and use of chemical weapons for decades. But the system as a whole is hardly rigorous; it is neither comprehensive, universally subscribed to, nor adequately verifiable.

To the extent that this legal regime has had much weight, it has depended largely on three intangibles. The first is the political cost that would be borne by states which break with its terms. These political costs would be high for many states, but we are learning that they are not so high for others. This group would include those states or regimes struggling for their survival as well as those whose relations with the major international actors are enmeshed in a complex web of interests. For example, compelling international opprobrium could not be brought to bear on Iraq after its use of chemical weapons because of the complicated U.S. history in the region, uncertain Western interests in the oil trade, complex Mideast politics, and the place of the Iran-Iraq conflict in East-West relations.

The second intangible is morality. The Western abhorrence of chemical weapons is firmly rooted in the experience of World War I. Those who did not share in that experience may not share

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the moral compunction not to use chemical weapons to the same degree. In wars like that between Iran and Iraq, where human wave attacks across mine fields are reportedly led by "expendable" young children, it is difficult to see how Western moral sensibilities might be of any relevance.

The third intangible is the confidence, however marginal, that the arms-control process has inspired in the minds of military planners that the momentum of events is carrying us toward the effective elimination of such weapons rather than their broader proliferation, thus reassuring those planners that their competitors do not contemplate using such weapons.

Ongoing negotiations at the U.N.-affiliated Conference on Disarmament in Geneva are aimed at creating a chemical weapons convention (CWC) that would provide a comprehensive and verifiable global chemical disarmament agreement. These efforts have been supplemented sporadically over the last 15 years by bilateral meetings between the United States and the Soviet Union. Two events mark the current phase of this effort.

The first event was the April 1984 submission by then-Vice President George Bush of a draft treaty. This submission broke a long lull in U.S. activism and helped recapture for the United States a degree of credibility on the issue. That credibility has not always been high. It was tarnished by the 50 years the United States took to accede to the Geneva Protocol, by the U.S. use of chemical defoliants in Vietnam, and, more recently, by the Reagan administration's strong commitment to renewed chemical weapons production and its general downplaying of the arms control agenda.

The second event marking the new phase was the emergence of Mikhail Gorbachev, which prompted a dramatic shift in Soviet negotiating style and substance. Gorbachev has articulated a high degree of interest in chemical arms control and has raised expectations considerably. Under his leadership, the Soviet negotiating team has moved in the direction of nearly every Western negotiating position, including particularly significant moves on verification.

The obstacles to an effective arms control regime are numerous. For example, the purpose of a CWC will be both disarmament and arms control--ensuring both that existing weapons are eliminated and that no new weapons are produced secretly. Furthermore, a CWC will have to be multilateral, even global. Verification of compliance with an agreement is both essential and profoundly difficult. Chemical weapons can be produced easily in small, seemingly innocuous facilities. Provision must be made for on-site inspections by trained experts; a measure of surprise is essential to deter those who cheat. The verification problem is especially acute in the developing world, where militarily significant cheating could occur at levels far below what would discomfit a superpower. These formidable conceptual and legal obstacles suggest a level of detail and breadth of scope unlike anything we have seen heretofore in arms control.

Technological change per se should not be an obstacle in the negotiating process. Detailed procedures have been elaborated that will permit and guide an international inspectorate in keeping abreast of changes in the chemical sciences and the emergence of new toxic substances with military applications.

The challenge provisions proposed by the United States and now largely endorsed by the Soviet Union are a radical solution to the compliance problem--mandatory international on-site inspections within 24 hours of request, any time and any place. The United States must now decide whether it can live with the intrusive measures it proposed for effective disarmament.

What are the prospects for the successful completion of a chemical weapons convention? A strong case can be made by the optimist. The effective reengagement of the superpowers in recent years has given a strong fillip to the arms control process. Movement in Soviet positions has created the framework for further progress. Expert working groups have fleshed out many of the details of a treaty. The principal actors face an array of political and military incentives--particularly the threat of chemical proliferation--compelling some form of agreement.

But the pessimists' case seems to be stronger for now. Even with Soviet acceptance of the U.S. position on verification, the verification problem has not been solved. Certain kinds of cheating will prove undetectable, however rapid or intrusive the inspection. Ironically, the United States and the Soviet Union may be able to agree on a verification regime that reassures that neither is engaged in militarily significant cheating; but in the developing world, surreptitious chemical weapons production and storage would be militarily significant at a much lower scale. This increases the likelihood that a chemical weapons convention may fall short of being truly global and comprehensive. A partial agreement that fails to disarm unstable areas of strategic importance, such as the Middle East, exposing U.S. forces and friends to chemical attack is less clearly in the interest of the United States--or the Soviet Union.

Given this global imperative, an effective agreement cannot be put together solely by the United States and the Soviet Union, however good their will, even working within the multilateral framework of the Conference on Disarmament. The onus is now on those other states possessing or seeking to possess chemical weapons. The United States and the Soviet Union could make it a common cause to tie formally their joint disarmament steps in the chemical weapons area to the actions of those states, perhaps with a joint, staged build-down agreement that ties the final stage of disarmament to steps taken in the developing world.

Recognizing the real obstacles to prompt and effective global disarmament, some analysts have proposed the application of regional interim solutions in the form of chemical weapons free zones. The elements of a European zone have been detailed and a modest amount of non-governmental dialogue has gone on in Europe since the idea was first put forth by the Palme Commission on Common Security in 1982. The essence of the proposal is the withdrawal behind the Urals of the Soviet chemical arsenal and across the Atlantic of U.S. munitions currently stockpiled in the Federal Republic of Germany (the latter will occur in any event by 1994). Whether such a zone is conducive to Western security is a subject of intense, if episodic debate.[12]

Technological Change and Chemical Disarmament

What does the foregoing analysis suggest in the way of conclusions about the relationship between technological change and the arms control process and prospects?

There is probably a connection between binary weapons production and arms control, but the precise character of that connection is difficult to gauge. Some have justified renewed chemical weapons production by the United States as reinforcing the arms control goal because it increases the incentives of the Soviet Union to get serious about arms control and the U.S. military capability. Others criticize production as the deathknell of the arms control process by signaling either a weakening of U.S. commitment to the disarmament goal or a reevaluation of the military utility of chemical weapons that will stimulate chemical weapons proliferation. Both arguments are credible; neither is persuasive.

A third argument runs as follows: even if renewed production is bad public diplomacy, it does not necessarily follow that it is bad for arms control. Arms control is an instrument of security, not its measure. Confusing the promise of arms control with its existence should be resisted. Actual disarmament will take a full 10 years from the time a CWC enters into force, in itself a number of years away by even the most wishful thinking. A nation feeling threatened by the chemical arsenal of a potential opponent might credibly choose to assure its interim security by producing a chemical arsenal for deterrence purposes without compromising its commitment to the disarmament goal (the INF analogy). France, for example, recently announced its intention to build such a stockpile.

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[12] Ralf Trapp, ed., Chemical Weapon Free Zones?, SIPRI Chemical and Biological Warfare Studies, no. 7 (Oxford University Press, Oxford and London, 1987).

Two further points must be made regarding the relationship between technological change and arms control. The first relates to the technology of verification. Regrettably, there is no technological fix to the verification problem--at least nothing in the short- to medium-term. The use of robotics and artificial intelligence may hold some long-term promise for ensuring the non-production of certain chemical agents in declared facilities, but that technology is not now available and in any case does not address the more complicated verification problem of non-production in undeclared facilities.

Second, the proliferation of chemical weapons made possible by the broader access to chemical goods and expertise is linked to the broader use of chemical weapons. The problem is not just the proliferation of chemical weapons, but their dispersal to states with revanchist ambitions led by men such as Muammar al-

Qaddafi, Hafiz al-Asad, and the Ayatollah Khomeini little attached to Western moral standards. This trend seriously undermines arms control prospects.

The Biology of War

Turning to biological weapons, one moves to less familiar ground and more difficult problems. With the successful conclusion of a Biological and Toxin Weapons Convention (BWC) in 1972, a global disarmament regime has been put in place in the area of biological weapons. What few arsenals of biological weapons that had been built in the years following World War II were presumably destroyed (in the case of the United States, the biological stockpile was unilaterally destroyed before the agreement was negotiated); further production of weapons was forbidden as was research for offensive purposes. The question of changing technology is central to understanding the future durability of the BWC.

Biological agents of war are living organisms such as bacteria, fungi, and viruses that kill by spreading disease. Such weapons have a long history in human warfare: in the 14th century, for example, the Tatar army defeated the besieged Crimean town of Kaffa by catapulting in corpses dead from the plague.[13] Though many living organisms are highly lethal to humans, biological weapons have not emerged as widely used instruments of modern war. The biological sciences so far have not proven well-suited to the dictates of modern warfare.

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[13] Newtol Press, "Haber's Choice, Hobson's Choice, and Biological Warfare," Perspectives in Biology and Medicine, 29:1 (Autumn 1985), 94.

Biological agents of war have a number of significant drawbacks as weapons. They are dangerous (and expensive) to produce, stockpile, and transport. Troops cannot be safely trained in their use or effectively protected against them. But perhaps most significantly, their dispersal cannot be controlled precisely and their military effect is uncertain even among those infected. These factors have led many to conclude that biological weapons have no military utility and that this accounts for the ease of biological disarmament. But this is a misreading of history and of biological weapons. In fact, biological weapons have potent utility but only in a very narrow range of circumstances--as strategic weapons in total war, as non-traditional weapons against political, industrial, agricultural, or social infrastructures, and as weapons of terror or blackmail in the hands of non-state actors. The United States and Soviet Union were able to agree on biological disarmament in the early 1970's because they possessed arsenals of strategic weapons similar in effect but different in mechanism to biological weapons (i.e., nuclear weapons) and because they wanted to nip in the bud any spread of biological weapons to others who might exploit their specific utility.

But unlike the area of chemical weapons, where the science and technology has changed relatively little since the 1950s, the biological sciences have undergone a revolution in the last two decades. The so-called biotechnology revolution has profound implications for our understanding of biological warfare. Its import stems from two factors. First, the newfound ability to manipulate and work with living organisms makes at least theoretically possible the production of biological agents or toxins that do not have the drawbacks for military purposes of traditional agents. Second, the revolution has precipitated much broader access to the kind of expertise and equipment necessary for biological warfare purposes, to the point today where nearly 100 countries are understood to have this level of capability.[14] However, it is difficult to gauge how assiduously the international military community has explored the biotech revolution for military purposes--and with what result.

The United States maintains a biological warfare research program consonant with provisions for research for defensive purposes under the BWC. This program has been described as follows:

> "Today the U.S. biological defense research program, administered by the army, focuses on developing vaccines against endemic diseases that U.S. troops are likely to encounter abroad...; against conventional BW agents...; against recently discovered pathogens...; and against exotic viruses....Military-sponsored research is also under way to understand how potent toxins work and to develop antidotes. Finally, the army is funding research and development on broad-spectrum antiviral drugs and ultrasensitive systems for rapidly detecting and diagnosing biological and toxin agents in the field. Since 1982, U.S. Army scientists have made increasing use of gene-splicing to study and

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[14] Testimony of Thomas Welch, Deputy Assistant Secretary of Defense (Chemical Matters), as reported in Defense Week, May 9, 1988.

> prepare defenses against extremely hazardous biological and toxin agents. Between 1980 and 1984, the number of Pentagon-funded projects using recombinant-DNA technology grew from zero to more than 40..."[15]

None of these research programs is classified (though some of the findings are) and all research is conducted in full compliance with recombinant DNA guidelines authored by the National Institutes of Health.

The United States intelligence community is disturbed by indications that the Soviet Union has maintained a biological warfare research program inconsistent with its commitments under the BWC. The level of Soviet activity is nearly impossible to gauge, especially for those not privy to intelligence information. Like much of the rest of the industrialized world, the Soviet Union has a high priority civilian program to explore the scientific and industrial potential of biotechnology. The Soviet military appears to be closely tied to that program, but with what result is unknown. The U.S. Defense Intelligence Agency has reported formally on Soviet biological warfare activities, concluding that

> "the size and scope of their [Soviet] efforts are not consistent with any reasonable standard of what could be justified on the basis of prophylactic, protective, or peaceful purposes....The Soviets are rapidly incorporating biotechnological developments into their offensive BW program to improve agent utility on the tactical battlefield."[16]

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[15] Jonathan B. Tucker, "Gene Wars", Foreign Policy, no. 57 (Winter 1984-85), 58-79.

[16] "Soviet Biological Warfare Threat", DST-1610F-057-86 (Washington, D.C.: Defense Intelligence Agency, 1986), 5.

There is growing concern about biological warfare-related activities in the Third World and among terrorist groups. Many of the factors cited above driving chemical proliferation have equal import in the biological area, particularly the growing access to materiel and expertise and the relative ease of producing militarily significant quantities of weapons of mass destruction. According to the U.S. Department of Defense, ten nations have developed or are actively working to develop an offensive biological weapons capability since the conclusion of the BWC in 1972.[17]

Perceptions of Military Utility

Since the biotechnology revolution is still underway, much of it behind closed doors overseas, we can only speculate about its near or long-term military and arms control implications.

Many dismiss the biotechnology revolution as largely irrelevant to biological warfare, arguing that even the most sophisticated new methods will not result in new agents more deadly than the already highly virulent naturally occurring agents. But the relative virulence of an agent is the narrowest possible measure of military utility. The changes in technology and expertise of the last two decades influence a whole set of technical parameters associated with the perceived military utility of biological agents and toxins.

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[17] Testimony of Thomas Welch, Deputy Assistant Secretary of Defense (Chemical Matters), as reported in Defense Week, May 9, 1988. Reportedly, most of these ten states are signatories to the Biological Weapons Convention; some are sponsors of acts of terrorism.

Clearly, the technical drawbacks to biological warfare have not been eliminated. But there is growing concern that those motivated to capitalize on the specific military benefits of biological warfare might today be able to undertake a program of research and production that would not have been as feasible two decades ago that actively minimizes the technical drawbacks to biological weapons. Militarily-significant quantities of biological agents can be produced more affordably and safely than in the past. They can also be produced more quickly, making possible the rapid breakout from a disarmed status. Gene-splicing technology makes it at least theoretically possible to produce a toxin with undetectable origin, giving great one-sided advantage to the side that knows how to produce the specific prophylactic innoculant. Some have suggested that it is possible to mask biological agents with other organisms so as to make the clandestine use of exotic agents untraceable (some allege that this is the connection between bee pollen and mycotoxins in Yellow Rain in Southeast Asia). Some have even claimed that it may ultimately be possible to design an "ethnic weapon" that selectively attacks humans of specific racial origin.[18] These changes have led one Defense Department official to conclude, "The prevailing judgment of years ago that BW is not a militarily significant weapon is now quite unsustainable. Biological weapons can be designed to be effective across the spectrum of combat...."[19]

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[18] Reports have circulated in recent years of attempts by the government of South Africa to design a biological agent that kills only blacks; such reports have been discredited as beyond the range of scientific possibility.

But if biotechnology has eroded prevailing judgments about military utility, what are the implications for the United States? Should the United States begin a major program in biological rearmament? Has the biotechnology revolution changed expectations about the Soviet non-use of biological weapons against the United States?

The revolution in technology has not changed our understanding of biological weapons as agents of mass destruction. An all-out Soviet first strike with biological weapons, even if employed in a non-traditional mode (such as the infection of U.S. military forces as a preliminary move to "soften-up" Western targets) would still likely precipitate a U.S. nuclear response. We should perhaps be more concerned today about two other scenarios. One is the Soviet use for tactical purposes of biological agents. The other is biological attack by non-state actors, such as terrorists. In neither case is the threat of U.S. nuclear retaliation particularly credible.

What if the biotechnology revolution results in weapons that are not massively destructive but still have military utility, i.e., biological weapons with tactical advantage such as instantaneous incapacitants? Clearly, the expectation (if founded) of facing such weapons should shape planning for the future battlefield environment; but it is difficult to envision how the possession of such weapons might add to NATO strategy in either retaliatory or first-use modes. It is also difficult to envision public support for the construction of such weapons, whatever their perceived military utility.

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[19] Testimony by then-Deputy Assistant Secretary of Defense for Negotiations Policy Douglas J. Feith to the Subcommittee on Oversight and Evaluation of the House Permanent Select Committee on Intelligence, August 8, 1986, 7.

The possibility--and partial evidence--that perceptions may be changing outside the United States about the military utility of biological weapons suggests that higher priority be given in the intelligence community to threat assessment. It also underscores the importance of an up-to-date understanding of the biotechnology of war so that biological agents can be identified and understood and innoculants devised in as timely a manner as possible.

Biological Arms Control

What are the implications of the biotechnology revolution for the biological arms control regime? In this instance, technological change has proven to be destabilizing. It has reopened questions in certain quarters about the military utility of biological and toxin weapons. It makes verification of noncompliance more difficult. It lowers the threshold for surreptitious breakout. It is likely to lead to the proliferation of such weapons and their use. The extreme view has been stated by the Defense Department official cited above, "The Biological Weapons Convention must be recognized as critically deficient and unfixable....The treaty has been overtaken by technology."[20]

This does not mean that the BWC should be cast aside as irrelevant to national and international security. The BWC is widely subscribed to and has dampened fears of biological proliferation and war. Furthermore, the document itself is not tied to a specific generation of technology. It can also be amended. The problem is not so much that the commitments undertaken by treaty signatories are somehow irrelevant today, as that the legal regime may come to be widely perceived as insufficient to contain treaty breakouts. The new challenge to the BWC is thus not so much new technology but an erosion of confidence in the utility of the BWC as an obstacle to the military application of that technology. This is both a technological and a political problem.

Confidence has eroded only in part because of technological change; it has also eroded because of compliance problems. Two types of compliance problems have undermined confidence in the arms control regime. One type of problem is posed by instances of indisputable treaty non-compliance--such as those cited by the Defense Department in the spring of 1988. The casting aside of existing commitments is likely to have an unsalutory ripple effect throughout the international community.

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[20] Feith, 9, 11.

A second type of problem is posed by instances of allegations of non-compliance. The debate about Yellow Rain is a case in point. Whatever one makes of the verity of the allegations by the U.S. government or its skeptics, by reopening questions about Soviet intent in the biological domain which have not been closed and by pointing to the possible creation of novel agents, the Yellow Rain episode created a sense of panic that the BWC had failed. The same can be said about the outbreak of anthrax in Sverdlovsk in the USSR in 1979, about which the Soviets have offered a belated if not wholly convincing account.[21] Whether the Soviets have cheated or not is of course crucial. But it is secondary to the argument here that disputes about treaty compliance that remain unresolved at the level of international public opinion undermine perceptions of the BWC as an effective agreement.

There is no easy way to make the BWC less imperfect. The addition of verification and compliance provisions, currently lacking from the treaty, would provide a more legally comprehensive framework but would be unlikely to be effective. A comprehensive inspection regime would be commercially intrusive, highly costly, and unlikely to satisfy its critics that it could deter or detect all militarily-significant cheating. As in the chemical domain, there appears to be no prospect of a breakthrough in remote satellite detectors. Some scientists have advocated an inspection regime based on such imperfect measures, arguing that it would be better than nothing; but such a regime might well have the unintended effect of weakening the BWC by consistently drawing attention to what cannot be inspected and known.

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[21] "Despite Soviet Account of Anthrax Outbreak, Questions Remain," The Washington Post, April 14, 1988, A26.

A pragmatic agenda to strengthen the BWC in the light of volatile technological and political circumstances should focus on two main items. The first is confidence building measures consistent with the original spirit of biological disarmament that civilian, peaceful applications of the biological sciences are a constructive endeavor while offensive military ones are not.

The BWC review conference of September 1986 pointed the way to tangible improvements in the regime, particularly in the greater openness of research.[22] Related measures such as bans on R&D for all military purposes and on troop training have obvious rhetorical appeal but are unlikely to contribute effectively to a more stable regime because they are either unverifiable or incredible.

The second item on the policy agenda should be finding a more effective way to resolve compliance disputes. The Sverdlovsk and Yellow Rain disputes demonstrate that in the absence of some established investigatory framework compliance questions escalate rapidly on the political agenda and come to be debated with less reference to the evidence and more reference to political predispositions. This is hardly constructive.

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[22] See the symposium on the "Second Review Conference of the Biological Weapons Convention" in Disarmament: A Periodic Review by the United Nations 10:1 (Winter 1986/1987), 43-72.

What is the place of the U.S. biological warfare research program in these priorities? What is desirable and permitted under the BWC? Such research by the United States has sparked considerable controversy within the scientific community as inconsistent with the U.S. commitment to biological disarmament. Civilian scientists have legitimately highlighted the thin line between offensive and defensive research while underscoring destabilizing potentialities.[23] But their arguments are sometimes carried to the extreme: "The notion of a biological warfare defense R&D program is a fundamental misrepresentation. The title of such a program implies that it is possible to defend one's civilian population from BW agents. In fact the only rationale for the development of a defense to a known agent is when one is planning to use that agent in an offensive mode."[24]

A contrary view has also been articulated. In its June 1985 report, the President's Chemical Warfare Review Commission concluded that

"the only sensible response [to the biotechnology revolution] is again for the United States not to ignore the problem, but rather to conduct comprehensive defensive research on biological agents and toxins under conditions of extreme care. The need is to be able to assess the likely threat, to develop detection measures and defenses, and to create sufficient uncertainty in the minds of Soviet leaders as well as those of other governments that they would hesitate to trust in such a method of warfare. At this time, the Department of Defense does not have an adequate grasp of the biological warfare threat and has not been giving it sufficient attention. Both intelligence and research in this area, though improved after a virtual halt during the 1970s, are strikingly deficient."[25]

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[23] Susan Wright, "The Military and the New Biology," special issue of geneWATCH, a bulletin of the Committee for Responsible Genetics, 1985.

[24] Jonathan King, "The Threat and Fallacy of a Biological Arms Race," geneWATCH 2:2, 13-16.

Such a program of defensive research can be defended as consistent with the purposes of the BWC--i.e., that the only way for a non-verifiable regime to survive changing technology is to provide for sustained investigation of that technology so as to limit the military incentives to breakout and surprise attack. But the policy community must ensure that all research conducted in the program is for strictly defensive purposes.

Conclusions

What does the foregoing analysis suggest in the way of conclusions?

First, to fully understand the import for arms control and national security of technological change one must look beyond how changes in the chemical and biological sciences have produced more potent poisons to the broad range of technical attributes pertaining to the development, testing, stockpiling, transport, weaponization, and use of such weapons, as well as relevant arms control verification technologies. An essential feature of technological change in these fields is that it has made derivative military capabilities more broadly accessible. Arms control cannot constrain the processes of international development that generate this expertise and access.

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[25] "Report of the Chemical Warfare Review Commission", 71.

Second, technological change is but one factor among many bearing on decisions in the policy and planning environment. We might speculate that a Soviet decision to maintain or augment its chemical and biological warfighting capabilities might be driven less by the advent of more potent systems than by improvement in NATO's conventional forces or by the deployment of a robust U.S. strategic deterrent. To look at the matter another way, technological change might make possible decisions justified on other grounds; some argue, for example, that the current Soviet interest in chemical disarmament may be sincere because their work on toxins and exotic biological agents has progressed so far as to render the chemical arsenal not only outdated but redundant.

Third, technological change and negotiated arms agreements are not incompatible. In the chemical area, technological change is not at the core of the arms control problem. In the biological area, recent technological changes have proven destabilizing but as yet not fatal to the arms control regime. Improvements in the technology of verification would help to strengthen the arms control regime, but no major breakthrough appears to be in the offing in the near- to mid-term. Verification and compliance remain politically volatile issues, vulnerable to a public debate prone to wishful thinking and double standards.

Fourth, even an imperfect arms control regime has some utility in constraining the actions of some actors and shaping the perceptions of others. If arms control is going to be an instrument of international security, it must account for our anarchic international system in which political factors and the struggle for power are major determinants of foreign policy behavior. Arms control--as regime and process--can be an effective tool for structuring incentives and shaping choices made by sovereign nations.

Fifth, the common tendency to debate the cbw problem in U.S.-Soviet terms narrows our understanding of the issues. To be sure, some aspects of the problem are rooted in the superpower competition. But other aspects shape the environment in which that competition proceeds. Yet other aspects are largely unrelated to the superpowers--particularly in the area of proliferation. Furthermore, solutions to the chemical and biological warfare problems and the achievement of a comprehensive, effective disarmament regime are beyond the unilateral reach of the United States. This is not, however, to say that the actions of the United States are without consequences.

THE
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**SUBMITTED TESTIMONY OF FRANK J. GAFFNEY, JR.,
DIRECTOR, THE CENTER FOR SECURITY POLICY
BEFORE A JOINT HEARING OF THE
SENATE GOVERNMENTAL AFFAIRS COMMITTEE AND
THE PERMANENT SUBCOMMITTEE ON INVESTIGATIONS**

9 February 1989

Introduction:

Mr. Chairman, members of the Committee, it is a particular pleasure for me to appear before a joint hearing of the Committee and its Permanent Subcommittee. These distinguished panels of the Senate were the locus of my first employment with the United States Government nearly 13 years ago. I have always had fond memories of my time with the PSI's then-Chairman, Sen. Henry M. Jackson, and I can honestly say that there is no more appropriate venue for my testimony on chemical weapons than this one.

This is so for several reasons: First, it was Sen. Jackson who taught me much of the practical limitations of arms control, especially in the area of verification and enforcement of compliance -- two subjects to which I will return momentarily.

Second, Sen. Jackson shaped my early thinking about the nature of -- and the vital need for -- deterrence in the world in which we live. Scoop understood that the world was not always as we would like it to be. I learned from him that we should seek to improve it where we could but that the United States must be able, where necessary, to deter military aggression and other forms of violence. This required the maintenance of our own, effective military forces and, if possible, close collaboration with key allies.

Third, it was during my service with Sen. Jackson that I became concerned about the problem of chemical weapons (CW). At that time, the United States had, for most of a decade, observed a unilateral moratorium on the production of chemical munitions. Evidence was mounting that the existing U.S. stockpile of chemical weapons was increasingly obsolete and -- to an alarming degree -- comprised of leaking weapons likely to prove more dangerous to American personnel than to our adversaries.

Sen. Jackson was concerned in the late 1970's about the very considerable offensive and defensive CW capabilities of the Soviet Union. He understood that the unilateral U.S. disarmament that would, in effect, result from our continued failure to modernize America's chemical arsenal could invite lethal chemical attacks against us and our allies.

Restoring America's Chemical Deterrent:

Gradually, a bipartisan coalition formed in the Senate -- thanks not only to Scoop's leadership, but also to the work of the distinguished co-chairmen of this hearing, Senators Glenn and Nunn, and then-Senator John Tower. By the early 1980's, a majority in the Senate believed that production of a safer form of chemical weapon -- known as binaries -- was essential if the United States were to retain a credible CW deterrent. Eventually, and belatedly, the House of Representatives followed suit.

The legislative struggle to overcome the inertia of America's unilateral moratorium on chemical weapons production is one of the great parliamentary sagas of our time. I am proud to have played a small part in it as a member of the Senate staff.

Interestingly, it [illegible] not only years of effort and great courage on the part of [illegible] members of Congress; it also required the then-Vice President, George Bush, to cast the decisive tie-breaking vote for chemical modernization on no fewer than **three** different occasions. This pivotal role is often cited as the catalyst for President Bush's intense personal determination to negotiate a ban on all chemical weapons.

Late in 1987, the United States finally resumed the production of chemical munitions, clearing the way to replace the existing inventory on a less than one-for-one basis. As a consequence, **we have begun to restore to the U.S. arsenal the single, proven deterrent to chemical aggression -- a reliable and effective chemical retaliatory capability.**

The prescience of President Reagan in requesting this capability, and that of the Congress in ultimately approving it, is now clearer than ever. Not only does the Soviet Union retain its formidable capacity for conducting chemical warfare; today a growing number of Third World nations are obtaining the means to produce and use lethal chemical agents -- the subject of these hearings.

The Lessons of the Libyan Plant:

The much publicized Libyan chemical weapons plant at Rabta is but the most recent -- if among the most frightening -- of the emerging CW programs in developing countries. While Qaddafi's potential to employ toxic chemical weapons in pursuit of his own aggressive aims (or on behalf of the international terrorists he supports) is grounds for ample concern, at least as troubling should be what the Rabta facility suggests about CW proliferation more broadly.

o First, this plant illustrates the point that there is simply no certain way to distinguish between legitimate facilities producing a range of chemical products for civilian use (e.g., fertilizers, pesticides, pharmaceuticals, etc.) and those producing weapons. The catastrophe at Bhopal, India reveals just how lethal can be the products of some such facilities -- even when used for civilian purposes.

o Consequently, the industrialized world's companies, banks and, yes, even governments are -- knowingly or not -- fostering the spread throughout the developing world of indigenous infrastructures with the inherent capability to produce chemical weapons. West Germany's assistance to the building and fitting out of Libya's Rabta complex is an infamous, but hardly unique, example of the phenomenon. The sources of chemical technology appear to be either indifferent to the potential for misuse -- as the German exporters seemed to be -- or they are willing to overlook it in the interest of making a sale.

o Even if one were able to determine on a given day -- or, for that matter, over a period of time -- that a plant was engaged in the manufacture of commercial chemical products, there is no known means of ensuring that its equipment will not be put to CW-related uses shortly thereafter. It was for precisely this reason that the United States properly declined when Qaddafi proposed to allay our concerns about the Rabta facility by offering an on-site inspection of it.

o The Rabta plant is, if anything, **more obviously associated with military activities** than one would expect to observe at facilities that were either engaged in covert manufacture of chemical weapons or being held in reserve against the day when such manufacture was deemed necessary. Its reported 40-foot earthen wall, rings of air defenses and other security measures are fairly compelling, albeit circumstantial, evidence of the purposes to which it will be put.

- **It has, nevertheless, proven remarkably difficult to obtain allied -- to say nothing of neutrals' -- endorsements of the U.S. assessment of the Rabta complex. Perhaps the governments in question are unpersuaded because such a finding would be inconvenient for their relations with the Libyans -- possibly exposing them or their citizens to increased threat of Libyan-sponsored terrorism. Or it may be that their acknowledgement of the facts might oblige them to take some responsibility for resolving the problem (e.g., sanctions or endorsement of military action).**

  Whatever the reason, the fact is that -- **even in the absence of a treaty banning production of chemical weapons** -- it is excruciatingly difficult to get international agreement that a given activity is related to chemical weapons manufacture. We must expect that, should a treaty outlawing chemical weapons ever be achieved, persuading others that a given country (the Soviet Union, for example) is violating the agreement will become still more difficult.

- It is far from clear what the Libyans could now do --should they wish to do so -- to persuade the United States that they have completely eliminated their incipient CW capability. Just as the Libyans were reported several weeks ago to be spiriting lethal precursors away from the Rabta facility, so too they could secretly relocate (or try to procure anew) the equipment needed to combine them with other agents to produce toxic agents for weapons. The termination of chemical warfare-related activities is likely to be as difficult to verify as their conduct.

These considerations serve to make two points: First, **chemical weapons proliferation is a fact of international life.** Such weapons can be manufactured cheaply; there is neither a need for expensive, dedicated facilities (as with nuclear weapons plants) nor for great technical sophistication. Countries around the world are availing themselves of the ability -- actual or potential -- to produce lethal chemical agents.

The reasons for their doing so are diverse: Some regard it as the easiest route to obtaining weapons of mass destruction -- the poor man's atom bomb. Of these, some fancy CW's offensive potential, as vividly demonstrated in the effective use made of toxic chemical weapons by Iraq in its war with Iran. Many of the others, see possession of CW as a feasible means of checkmating an adversary's nuclear arsenal.

Then there is the somewhat special case of a nation like Libya. Its purpose in acquiring a chemical weapons manufacturing capability appears motivated, at least in part, by the desire to add CW to the gruesome tools of the trade of the world-wide terrorist groups it sponsors.

A second point is that **the aforementioned factors make any effort to respond to CW proliferation by negotiating a ban on the production and stockpiling of chemical weapons dangerously futile.** It is simply not possible today to prevent countries with modern commercial chemical industries from also having thereby the ability to produce chemical weapons. There is no verification system known today or in prospect that will be able unfailingly to detect lethal chemical agent production and storage.

What is more, as the technology for manufacturing chemical products advances, the few signatures that today do provide important indications of CW activity are likely to disappear. Devices are already available on the commercial market that can manufacture lethal chemical agents (and, for that matter, toxin and biological weapons) **without specialized or dedicated facilities.** In fact, such agents can, with this technology, be produced virtually anywhere. There is no practicable verification scheme for dealing with such technical developments.

The United States Government's 1987 Reassessment:

Considerations such as these in 1987 prompted **every involved agency of the United States government to recommend that the formal U.S. position seeking a global ban on chemical weapons be abandoned.** It would be hard to overstate the significance of this recommendation.

After all, the United States had been committed publicly to such a ban since Secretary of State George Shultz took it upon himself -- without formal coordination or Cabinet approval -- to announce that we would table a treaty for a global CW ban in a speech given in Stockholm in January, 1984. Moreover, Vice President George Bush in April 1984 personally tabled a U.S. text for a draft treaty prohibiting CW production and stockpiling that the U.S. government hastily put together following the Shultz announcement. That draft treaty called for developing the most rigorous verification regime ever designed -- one that would provide for inspection of suspect sites "anywhere, anytime."

Given this highly visible and forward-leaning public position on a CW ban, it was nearly inconceivable in 1987 that the United States government could actually change its mind. Not only would there be the considerable diplomatic embarrassment entailed in abandoning a position advanced at the highest levels;

America's allies were virtually unanimous in their enthusiasm for a ban. It was also argued that the modest program for modernizing the U.S. inventory of chemical weapons would be halted if Congress saw a backing away from the concomitant effort to prohibit CW.

It was, nonetheless, a reflection of the perceived infeasibility of a ban on chemical weapons -- **and the real risks that would accrue to the United States were it to enter into an unverifiable one** -- that prompted the 1987 interagency consensus in favor of a change of U.S. CW arms control policy. But for the intervention of representatives of then-Vice President Bush who objected to the proposed change, I believe the United States government would have disavowed its own goal of negotiating a "global," "verifiable" chemical weapons ban in favor of more modest limitations.

Problems with the Current Administration Position:

Instead of putting aside the illusion of such a CW ban, the United States is today moving forward inexorably -- in part thanks to the new impetus provided by the recent international conference in Paris -- toward its negotiation. In fact, anything that will emerge from the Geneva negotiations is unlikely to be either "global" or "verifiable:"

A less than "global" ban: As it may well prove impossible to get every nation to subscribe to the ban, the U.S. position is that the United States will enroll so long as **some** substantial number of other countries (e.g., sixty) do so. On the face of it, this means that America could enter into an agreement requiring it to eliminate **all of its CW capability** while many other nations are under no such obligation.

We are assured that, before the United States becomes a signatory, others like the Soviet Union, Iraq and Libya must agree to sign up. But this approach begs several questions: What if nations suspected of having CW are not among the signatories -- will the United States still disarm? Even if non-signatories did not have a chemical weapons capability at the moment of U.S. signature, do we believe they will not obtain one subsequently? What would we do if they did?

A less than "verifiable" ban: As a practical matter, there is no such thing as a verifiable ban on chemical weapons. Short of true omniscience, in any arms control agreement involving closed, totalitarian societies, there is always some degree of verification uncertainty. What invariably occurs is a two-step process that erodes the value of any agreement reached:

First, the negotiators arrive at a lowest-common-denominator solution; they establish the degree of intrusive inspections and other monitoring arrangements that every signatory can accept. Inevitably, this outcome falls far short of what is required to verify even less daunting arms control agreements than a global CW ban.

Next comes the overselling of the treaty's verification provisions. Executive branch officials troop to the Senate to attest to the verifiability of provisions they know to be deficient in important respects. They rationalize that, as long as the treaty can be "effectively," or "sufficiently" or "adequately" or "reasonably" verified, that is enough. In any event, it is the best they could get. In the end, they are betting that a party to the treaty will not cheat. The theory usually is that, even though such a party can be reasonably sure that its cheating would not be detected, it will, nonetheless, be deterred from doing so by the threat that other signatories' will take unpalatable retaliatory steps.

Compliance and Non-compliance:

Regrettably, as the recent Paris conference illustrated so well, there is **no reason whatsoever** for believing that collective enforcement of compliance will occur. Indeed, the conferees found themselves unable even to mention countries (such as Iraq) clearly guilty of violating the existing international arms control agreement on chemical weapons -- the 1925 Geneva convention banning their first use.

It is hard to imagine that the nations of the world will be more willing to take punitive measures when the result of a violation is not the wholesale murder of innocent civilians, brutally documented by television, but simply the existence of a building suspected of manufacturing illegal agents. If anything, the quarrels over the exact nature of the Libyan plant at Rabta augur ill for even reaching consensus positions on the **facts** concerning such facilities.

Biological Weapons:

This question of verification, compliance and enforcement is not, unfortunately, an idle one. **There is already on the books a global ban on easily produced, cheap weapons of mass destruction -- the 1972 prohibition on biological weapons (bw).**

Like that being sought for CW, the Biological Weapons Convention is utterly unverifiable; its framers, however, understood it to be so and simply dispensed with any effort to draft verification provisions. Like the proposed CW ban, it is supposed to prevent any nation from obtaining and stockpiling quantities of the prohibited substances. And, as will surely be the case with any future ban on chemical weapons, it is being violated by at least several of its signatories (e.g., the Soviet Union and Iraq). Yet, the United States remains in total compliance with its commitments under the Biological Weapons Convention.

This compliance extends not only to the literal obligation not to produce and possess **offensive** biological weapons; the United States today has essentially no capability to **defend** against biological attack by others. Understandably, the U.S. military has -- in the aftermath of a solemn international agreement that is supposed to eliminate all BW weapons -- accorded the biological warfare threat a low budgetary and doctrinal priority.

Unfortunately, the combination of this country's utter defenselessness against BW and its lack of an in-kind deterrent to biological weapons use against the United States could invite such use. At a minimum, it provides a powerful incentive to an adversary to exploit the inadequacies of the existing international convention banning biological weapons and attendant U.S. (and, more generally, Western) vulnerabilities.

A similar situation to that we face in the biological weapons area would almost certainly arise in the aftermath of a ban on the production and stockpiling of chemical weapons: The United States would faithfully comply with its terms. Its retaliatory stockpile and associated production base would be quickly rendered unusable and, in due course, would be eliminated. The United States would not only submit to whatever monitoring and inspection regime were agreed; it would also ensure through domestic laws and regulations that no inadvertent circumvention occurs.

Perhaps most sinister of all, the United States would almost certainly succumb over time to the temptation to dispense with **defensive CW training and preparations**. In fact, as hearings in the Armed Services Committee have repeatedly shown, even in the face of a massive -- and growing threat -- U.S. CW defenses are already exceedingly modest. How much less capable they will become when there is not supposed to be any CW threat can only be surmised.

Conclusions and Recommendations:

Forget About Banning Chemical Weapons

For these reasons, **I strongly recommend to the Committee and the Subcommittee that you regard the Bush Administration's pursuit of a global, verifiable ban on chemical weapons with**

great skepticism. The President must be encouraged to abandon this potentially dangerous goal.

Ironically, those in the Administration responsible for fulfilling President Bush's oft-stated commitment to such a ban know better. Some senior officials have privately expressed to me their view that the ban is ill-advised; their hope is that, eventually, they will be able to disabuse the President of his illusions. In the meantime -- at least in the absence of vigorous Congressional scrutiny -- these officials appear unwilling to admit that the "emperor has no clothes." As a result, the United States lurches inexorably onward toward a dangerous, unverifiable chemical weapons ban.

I believe the United States cannot afford to engage in such hypocrisy. It is irresponsible to pay lip service to an objective whose accomplishment we know would be highly dangerous. American participation in a chemical weapons ban is -- and will under all foreseeable circumstances remain -- simply a formula for unilateral U.S. chemical disarmament. It is beneath us as a nation **and, in any event, a delusion** to believe that we can prevent this outcome by simply dragging our feet in the negotiations over some technical point of verification or another.

There are, of course, those who advocate a CW ban even though they understand that it might result in our complete disarmament without effecting a perfect ban world-wide. They tend to argue that it would be worth our while to give up our deterrent if that is the necessary price for dissuading even some nations around the world from acquiring chemical weapons. Such individuals frequently assert that whatever risks arise from other nations not being so dissuaded (i.e., those that choose to possess quantities of chemical weapons), can be fully offset by the deterrent value of our nuclear arsenal.

Scoop Jackson, for one, would have been appalled at the naivete and dangerous caprice involved in such statements. He would have given short shrift to the notion that, under present circumstances, we can responsibly enter into a CW ban in the hope of offering a model that others may or may not choose to follow. This would be particularly true given the verification uncertainties with which such a ban is fraught. Sen. Jackson also recognized the real limitations on threatening the use of nuclear weapons to deter less than wholesale conventional or nuclear aggression. I hope those who serve in the Senate today will be as wise.

Indeed, Congress can -- and, in my view, must -- play an instrumental role by demanding honest appraisals of the prospects for a global, verifiable ban from Administration spokesmen. Halting the United States' headlong pursuit of a dangerous CW ban -- and challenging the wishful thinking that motivates it -- will require no less courage than Congress exhibited in approving the binary program some years ago. And yet, the risks to U.S. and allied security of doing otherwise are no less great than those that prompted the prudent, earlier action.

Pursue Other Measures for Curbing CW Proliferation

This is not to say that we are unable to take -- or should refrain from taking -- steps to slow the proliferation of chemical weapons. I strongly support economic sanctions as a means of imposing real penalties on those who would sell or buy CW-related capabilities. I commend Senators Pell, Dole and Helms for their leadership in this regard.

Obviously, if the United States hopes to prevail upon the other advanced industrial nations to give up lucrative sales of CW-related materials to developing nations, we must observe a consistent standard ourselves. On that point, I hope that the Bush Administration and the Congress will act to reverse a ill-considered decision taken in the last days of the Reagan Administration. This decision would permit two American firms, Honeywell and Bailey Controls, to provide the Soviet Union with the technology and equipment to manufacture under joint ventures automated controls that lend themselves to more efficient CW (and nuclear) weapons production.

I would strongly urge, as well, that the Congress look carefully at the means whereby countries like Libya obtain the financing by which they can buy chemical weapons-related facilities. It seems quite likely that allied banks and companies have made such procurements possible through their credit arrangements with and/or deposits in the Libyan Arab Foreign Bank. Swift action aimed at denying the Libyans such sources of revenue could have a dramatic effect on their ability to proceed with a CW program.

Finally, I hope the Congress will recognize that the threat of chemical agents coming into the hands of state sponsors of terrorism like Libya is a sufficient menace as to warrant physical destruction of the site, if the preceding techniques prove ineffective.

Maintain the U.S. CW Deterrent

In the end, however, Mr. Chairman, **I do not believe the United States can prevent Libya -- or other nations so disposed -- from obtaining the capability to manufacture chemical weapons through an arms control agreement**. The effect of such an accord may be to slow proliferation marginally or -- more likely -- to make evidence of proliferation harder to come by. What it will assuredly do, however, is to prevent the United States from retaining the ability to deter chemical attacks against it and its allies by threatening credible, in-kind retaliation.

Based upon my thirteen years of professional experience in this field, starting with my service to this Committee, I must tell you such an outcome would entail unacceptable risks for U.S. national security and should be avoided at all costs. Unless and until a better, more reliable approach to preventing the use of chemical weapons against U.S. and allied personnel can be found, I believe the United States must maintain its own, modest but effective chemical retaliatory capability.

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6 January 1989

THE LIBYAN CHEMICAL WARFARE FACILITY: A LESSON IN THE DO'S AND DON'TS OF CONTROLLING THE PROLIFERATION OF CHEMICAL WEAPONS

Introduction:

Over the next few days in Paris, leading members of the international community will consider a serious threat to world peace: the proliferation of chemical weapons (CW) and a growing willingness by nations to engage in their use. The latter has occurred in several parts of the Third World, notably in the Iran-Iraq war, in violation of the existing 1925 Geneva convention banning first-use of chemical weapons. The threat of still more widespread CW employment mounts as additional nations obtain ballistic missile and other technologies compatible with long-range delivery of lethal chemical agents.

Many of those participating in the Paris meeting -- including the United States government -- have embraced the view that the proper response to the violation of the present chemical arms control regime and the growing number of countries possessing chemical munitions is to adopt a new, global ban on production and stockpiling of these weapons. The conference is expected, as a result, to impart new impetus to the on-going multilateral negotiations in Geneva on a treaty imposing such a ban.

The meeting in Paris will also feature -- if not be dominated by -- discussions of the incipient capacity of Libya to produce large quantities of chemical weaponry. Ironically, the massive Libyan facility provides a prime example of the utter futility of a global chemical weapons ban.

What the Libyan Plant Demonstrates:

Recent public disclosures concerning the consultations the United States has had with allied and other nations on the character of and need to deal with the nearly completed Libyan chemical manufacturing complex reveal two key factors that render a global CW ban infeasible:

Verification: While the Libyan plant is a dedicated CW facility, Ghadafi's protestations that it is a pharmaceutical complex nicely illustrates the problem: essentially any facility that actually is meant for production of civilian chemical products (for example, pesticides, fertilizers, and pharmaceuticals) has the inherent ability to produce toxic chemical agents for weapons.

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The length of time it might take a given country to convert its chemical plants from innocuous activities to lethal military ones could be exceedingly short. How short would largely depend upon the extent of advance preparations undertaken, subject entirely to the control of the government in question. Such considerations defy any known verification scheme -- a point made starkly recently by representatives of the U.S. government in rejecting the Libyans' invitation to perform an on-site inspection of their new complex.

In fact, the verification problem associated with a CW ban is made even more intractable by the fact that **chemical agents (and biological and toxin weapons for that matter) can now be manufactured using commercially available systems that can be located at essentially any facility.** There need not be any unique construction features or other signatures to such facilities that might assist in identifying and monitoring them for compliance with a global CW ban. The truth of the matter is that one is not likely often to have as abundant circumstantial evidence about the malevolent purposes to which a given production complex is devoted than is presently the case with the Libyan site -- reportedly ringed by a 40 foot earthen wall, highly sophisticated air defenses and other security features.

Enforcement: The behavior of the international community to date in response to that astonishing evidence demonstrates the further problem one faces even where it is possible to make a strong case that CW activity is underway. **Few countries are willing to endorse a conclusion certain to result in unpalatable choices:** either living with the knowledge that a regime that aggressively sponsors and equips world-wide terrorist activities has the ability to produce the "Poor Man's Atomic Bomb" or taking steps to eliminate that ability. Even where there is considerable reason to believe that nationals of allied countries have been directly involved in constructing and financing the Libyan CW complex -- and, therefore, have first-hand knowledge of its capabilities -- these allies recoil from accepting the obvious conclusions.

What is more, experience has shown that the more solemn the international commitment being breached by an activity, the more resistant third-party nations become to crying foul. The United States has encountered this phenomenon repeatedly in its effort to arouse allied ire over Soviet violations of various arms control accords, notably the clear-cut breach of the ABM Treaty by construction of an illegal radar at Krasnoyarsk. It is only reasonable to expect that it would be even more difficult to arouse international outrage over a suspected infraction of a newly signed CW ban than is the case at present with the Libyan plant -- especially where the evidence is less compelling.

Policy Prescriptions:

The current crisis over the Libyan chemical weapons plant argues for adopting certain policies for contending with the Libyan and other episodes of chemical weapons proliferation:

- The West should abandon the illusion that CW proliferation can be halted -- or even meaningfully slowed -- by an inherently unverifiable ban on production and stockpiling of chemical weaponry.
  - Western democracies must discard the notion, and the accompanying rhetoric, that an effective verification regime might be developed that would redress the intrinsic and unavoidable problems associated with such a treaty.
  - Doing otherwise is a formula for chemical disarmament only on the part of nations -- like the United States -- that live up to its international commitments.
- Instead, the United States and its allies should be focussing on enforcement of the **existing** CW arms control convention -- banning first-use of chemical weapons.
  - Establishing the willingness of nations to take specific, practical actions in response to such first-use would not only have a salutary effect insofar as it shored up the present inhibition to CW activities.
    - It would also provide an important bellwether of the willingness of the international community to demand compliance with future arms control accords.
- The United States and other Western nations should also maintain modest, but effective stockpiles of chemical weapons -- the only time-tested deterrent to the use of toxic CW by aggressors.
  - In this regard, Vice President George Bush -- to his lasting credit -- on several occasions since 1983 has played a politically courageous role in casting deciding votes in the Senate for the long-overdue modernization of the U.S. arsenal with binary chemical systems.
- The United States (and, preferably, other allied nations) should not rule out the use of force against identified CW production capabilities of countries like Libya that actively support international terrorism and aggression.

- As an immediate step, however, the United States should -- at the Paris meeting and thereafter -- press for specific economic and financial steps against Libya.
  - All contracts involved in the construction, equipping and operation of the new Libyan chemical production complex must be terminated at once.
    - Any foreign company found not complying with this demand forthwith should be subject to U.S. import controls under the Export Administration Act, with the effect of barring them from exporting to the U.S. marketplace.
  - All financing associated with the construction, equipping and operation of the Libyan CW complex must cease, for example all disbursements under existing loan agreements should be terminated and no new supplier credits offered.
    - Any foreign bank, company or consortium providing credit to the Libyan Arab Foreign Bank or other agencies of the Libyan government in connection with this facility found not complying with this demand should be subject to restrictions on their banking activities within the United States (e.g., the operations of their U.S. branches and subsidiaries).
  - All Western deposits in the Libyan Arab Foreign Bank should be immediately removed (through the interbank deposit market) pending the complete dismantling and elimination of the Libyan CW plant.
  - By forcing such enterprises to choose between the American market for their goods and services and that of Libya, a direct and therapeutic impact can quickly be had on the Libyan regime and the means by which it hopes to advance its anti-Western agenda.

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* This paper is one of a series of occasional contributions by the Center for Security Policy to the national debate on foreign policy and defense issues. Such contributions are intended to invigorate and enrich that debate; they do not necessarily reflect the views of all members of the Center's Board of Advisors. If you would like more information about this topic or other work of the Center, please contact the Director, Frank J. Gaffney, Jr.

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CENTER FOR SECURITY POLICY

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IS THE UNITED STATES ALSO EXPORTING CHEMICAL WEAPONS MANUFACTURING TECHNOLOGY?

A Dangerous New U.S.-Soviet Joint Venture

Summary:

In the midst of a major diplomatic crisis with one of its closest allies, the Federal Republic of Germany, over the transfer to Libya by the latter's nationals of equipment and technical know-how needed to manufacture chemical weapons, the United States to have approved a joint venture with the Soviet Union that could have even more damaging results.

In a rushed decision taken just before Christmas, the Reagan Administration has apparently given the go-ahead to the Louisiana-based Bailey Controls, Inc. and Honeywell to supply the Soviet Union with the wherewithal to manufacture extremely sophisticated automated production controls. These devices have the potential to enhance significantly Soviet military capabilities. Unless reversed, the Administration's decision on this transfer will:

(1) Put into Soviet hands modern technology exceedingly well suited to efficient chemical -- and nuclear -- weapons production;

(2) Call into question the sanctity of the existing East-West export controls system (COCOM) -- at the very moment the United States is trying to encourage a new arrangement to curtail chemical weapons proliferation;

(3) Send a signal to the Soviets and to domestic industries that even joint ventures with manifestly dubious implications for U.S. security will be approved.

The incoming Bush Administration should make one of its first acts in office a suspension of government approval for this joint venture. Such a suspension will afford an opportunity to perform a needed review of the deal's national security implications, including the chemical warfare proliferation dimension.

Facts and Discussion:

- In the period just before the Christmas holiday, the United States government was asked to approve a proposed joint venture between two U.S. companies (Bailey Controls, Inc. of

Louisiana and Honeywell, Inc.) and a state-run organization in the Soviet Union.

- The venture would entail the transfer of the necessary machinery and continuing technical support needed to permit the Soviets domestically to produce highly advanced automated control devices.
  - Comparable devices are currently used by, among other American companies, E.I. Dupont at the Department of Energy's Savannah River nuclear weapons production plant.
- These controls are well suited to the sort of precision manufacturing entailed in the production of modern chemical weapons.
- Nearly as worrisome as the outcome of the U.S. government's decision-making process on this proposal was the quality of the process itself.
  - Acting under pressure from Louisiana Senator J. Bennett Johnston to approve the joint venture, and from Secretary of Commerce William Verity and the State Department, who generally take a forthcoming attitude toward such endeavors, the Reagan Administration acted on this proposal with extraordinary and undue dispatch.
  - As a result, there was insufficient time to document -- to say nothing of consider -- the national security implications of this transfer.
  - Such was the haste that it is still not clear how the United States will attempt to justify such a transfer to its allies as being consistent with COCOM guidelines.

Conclusions:

- The outgoing Reagan Administration's hasty and unwise decision to approve the Bailey Controls-Honeywell joint venture with the USSR should be suspended at once.
  - The Bush Administration must have an opportunity to assess the wisdom of providing the Soviet Union with key systems that will allow it to manufacture chemical and nuclear weapons more efficiently.
  - At a minimum, the inconsistency of this technology transfer with the U.S. government's efforts to curb the export from Western countries of systems applicable to the manufacture of chemical weapons must be reviewed.

- If permitted to stand, this proposed joint venture will have severe repercussions in COCOM.
    - -- It comes at a time when pressure is already mounting to gut the modest, but vital, COCOM regime for safeguarding militarily-relevant Western technologies.
    - -- It also roughly coincides with the imminent announcement in Vienna of a major East-West economics conference to be held in Bonn in 1990 -- an event whose sponsors clearly intend it to help eliminate whatever remaining discipline exists regarding economic, financial and technology flows to the Soviet bloc.
        - oo The latter is the more striking as it contrasts with concerted Congressional efforts to stimulate **greater** discipline and transparency in such flows.
- Unless reconsidered and reversed, the Bailey Controls-Honeywell application threatens to set a dangerous standard for the consideration of future joint U.S.-Soviet ventures.
    - -- Clearly, the sensitive technology involved in this venture will encourage others both in the United States and in allied nations to seek to export similar -- or even more sinister -- dual-use equipment and know-how to the Soviet bloc.
    - -- Moreover, this venture will invite efforts to repeat the combination of ill-advised political and bureaucratic pressure that apparently forced approval of this export application through the U.S. government in record time and without adequate interagency review.

The New York Times

TUESDAY, DECEMBER 6, 1988 A35

Poison Gas, Poisoned Treaties

By Amoretta M. Hoeber
and Douglas J. Feith

In calling the use of poison gas in the Iran-Iraq war an "ominous terror" that has jeopardized the "moral and legal strictures that have held these weapons in check since World War I," President Reagan understated the point.

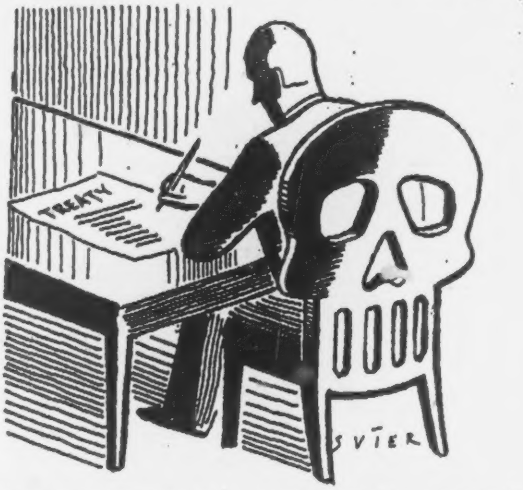
The Iraqi gas attacks not only violated the 1925 Geneva protocol banning chemical warfare, they mocked the very idea of controlling armaments and warfare through treaties. More broadly, they challenged the concept of international law itself, the first principle of which is that treaties must be obeyed.

Policymakers argue that the Iraqi gas attacks have made it imperative to finish negotiations at the Geneva conference on disarmament on a treaty calling for a comprehensive ban against chemical weapons — that is, banning their possession as well as their use. But why should we produce new treaties if we can't solve the problem of upholding the integrity of existing treaties?

The gruesome evidence of death and disfigurement wrought by the Iraqi attacks has been confirmed by investigators of unquestioned credibility. But the international community has taken no action to penalize the Iraqis for violating their treaty obligations. Neither the United Nations, the Geneva disarmament conference, nor any other multilateral forum in which new arms control treaties are championed has figured out a way to impose costs on states that openly violate such treaties. Indeed, no forum is even working on the problem.

Moreover, given its impotence in dealing with the illegal use of chemical weapons, it is difficult to believe that the international community can deal more effectively with the illegal possession of these weapons. Simply put, such a treaty cannot reasonably be expected to bring about the elimination of all chemical weapon stocks.

In a closed society, chemical weapons would be ridiculously easy to manufacture and store secretly. Chemicals can be militarily significant even in quantities small enough to be stored in one medium size industrial warehouse. And even if a country did not actually maintain stocks, it could, in preparation for a war, produce an offensive capability in a matter of weeks.



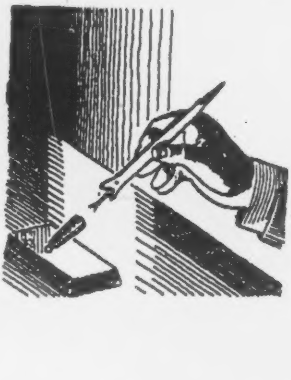
Not even a highly intrusive verification regime would afford our Government reasonable confidence that it could detect illegal production or storage in the states that are of greatest concern to us.

Some have argued that a comprehensive ban would be a salutary symbol of the civilized world's rejection of chemical weapons. But the value of this symbolism would be far outweighed by two factors: first, the increased risk that our forces would be attacked with poison gas if an ineffective ban deprived the United States of a chemical retaliatory capability; second, the debasing of international law if such a ban were not truly verifiable and not diligently enforced.

The Bush administration could do good by focusing the world's arms control forums on the problem of treaty violators. If effective political penalties cannot be organized, consideration could be given to financial ones — for example, substantial indemnities enforceable by a victimized party in the law courts of third countries — although it is possible that this will not be fruitful.

There is a price to be paid when bad treaties are promulgated and when any treaty is violated. It cheapens the currency. It promotes disrespect for all treaties, whether dealing with arms control, human rights or protection of prisoners of war. And the price that is paid is not distributed evenly. Democratic nations, whose internal checks on governmental action enforce compliance with their international obligations, suffer disproportionately.

International law is widely disparaged as mere grist for the mills of diplomats and academics. Yet arms control treaties are roundly favored in principle, indeed venerated, as a practical way to enhance international security. But arms control treaties are international law — no more, no less. They are as potent or as ineffective as international law in general. If international law is a bad joke — if treaties can be violated profitably and with impunity — then arms control too becomes a joke, with the laugh being on the states that comply with their treaty obligations. ☐



Amoretta M. Hoeber served as Deputy Under Secretary of the Army and Douglas J. Feith served as Deputy Assistant Secretary of Defense, both in the Reagan Administration.

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Opinion

Editorials

CHEMICAL WEAPONS: CAN THEY BE BANNED?

Too many ways to hide cheating

By Frank J. Gaffney Jr.

News Item: January 17, 1989, Washington. State Department sources disclosed today that the United States had evidence suggesting that Iraq (among other nations) has an active program for developing and producing biological weapons. Reports have been received charging that this nation, accused of attacking its Kurdish minority population with lethal chemical weapons, recently used biological agents to infect the Kurds with deadly typhoid germs.

This story is shocking on several levels. First, biological weapons (BW) are a particular heinous dimension of modern warfare. They are capable of prompt, brutal and wholesale human destruction. Second, BW agents can be cheaply produced, utilizing commercially available and relatively unsophisticated techniques. And third, it suggests that at least one country is willing — as are probably others — to risk international condemnation for trafficking in these monstrous weapons.

Interestingly, the same can be said of chemical weapons (CW). An important difference between the two classes of weaponry, however, lies in the fact that the production and possession of biological weapons is banned under international law; no such ban currently exists for CW.

In fact, apart from extremely modest research capabilities — dedicated solely to exploration of defenses against biological attack — no signatory is suppose to have *any* biological weapons-related activity. Today the ed States has neither offensive BW capabilities nor even any appreciable capacity to defend itself against biological first-use by an adversary.

And yet there is powerful evidence that a number of countries — including the Soviet Union, as well as Iraq — have active biological weapons programs. Unfortunately, the Biological Weapons Convention does not provide for inspection of suspected sites. Its authors acknowledged that there was no monitoring regime likely to be effective in detecting BW activities if a nation wished to

See GAFFNEY on Page C-6

Gaffney is director of the Center for Security Policy in Washington and an adjunct fellow of the Hudson Institute. He formerly held senior positions in the Reagan Defense Department.

Gaffney: Too many ways to evade a chemical, biological treaty

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conduct them clandestinely. It was argued at the time, however, that *some* constraints on this dreadful business were better than none; in the event someone was believed to violate the convention, the moral weight of international opinion would quickly bring them to heel.

I mention this not as an argument for a new, offensive biological weapons program. The United States will be lucky if it can organize a viable — and permitted — program for researching BW defenses and antidotes.

Rather, I bring up this sorry state of affairs because many (like Elisa Harris in the accompanying article) argue that essentially the same approach should be applied to chemical weapons (CW). So great, we are told, are the risks of proliferation of chemical weapons — particularly in the Third World — that a ban on CW production and stockpiling must be quickly reported.

The unhappy truth of the matter is that, even if such a ban could be negotiated, replete with provisions for on-site verification far surpassing the admittedly unverifiable Biological Weapons Convention, the same outcome must be expected: The bad guys will retain illegal stocks of the banned substances and the good guys will dutifully disarm. Ronald Reagan used to say about a situation like this, "Fool me once, shame on you; fool me twice, shame on me."

The following are but a few of the reasons why we must not allow ourselves to be fooled again:

● **A treaty banning chemical weapons is unverifiable.** If the debate over the exact character of the Libyan plant at Rabta demonstrates one thing vividly, it is that facilities capable of producing chemical weapons can take many forms and still be rapidly configured to manufacture toxic agents. Intrusive on-site inspection simply cannot ensure that such facilities remain unavailable for CW production — any more than it could be used to verify a ban on biological weapons. As the United States pointed out in rebuffing Moammar Gadhafi's invitation to visit the Rabta plant, even if one could tell what a fertilizer, pharmaceutical, pesticide or other complex was producing on any given day, there would be no assurance that chemical weapons were not being produced there on the next.

● **There is no real prospect of enforcing a global ban.** Even where there is powerful evidence to suggest that a given facility is up to no good, it is naive to believe that that evidence will be judged persuasive by Western governments — to say nothing of it precipitating sanctions or other enforcement measures.

Again the experience with the Biolgical Weapons Convention is instructive: When an illegal Soviet BW plant at Sverdlovsk blew up some years ago, venting lethal anthrax germs and killing substantial numbers of innocent people downwind, the international community — far from taking steps to enforce the breached arms control regime — indulged in endless arguments over the precise character of the facility. Those, we are assured, would enforce a new agreement banning chemical weapons did little more than fecklessly debate alternative explanations for the incident — including a number of tortuous and implausible ones advanced by the Soviets themselves.

Similarly, that community has shown itself utterly incapable of enforcing the *existing* limitations on chemical weapons. At the recent 149-nation conference on CW in Paris, the participants could not even bring themselves to condemn Iraq by name — to say nothing of imposing harsh economic or political sanctions against it — despite appalling and incontrovertible evidence of Kurdish and Iranian victims of Iraqi chemical attack. Indeed, the world was treated at that conference to the sight of Iraq, Vietnam, Libya, and the Soviet Union, all of whom appear to have violated the ban on first-use of CW, solemnly denouncing such use.

And yet people like Harris would have us believe that the adoption of a ban on chemical weapons production and stockpiling will not result in similar flimflammery. They argue (usually with straight faces) that the world community will act effectively to enforce a new treaty vigorously should it be violated — even though the evidence will be inevitably less compelling than in cases of first-use.

This is, as Samuel Johnson once said about second marriage, simply "the truth of hope over experience." The recent antics of the West German government in connection with the Libyan facility at Rabta — which German nationals, after all, have helped design and construct — signal that such hope is entirely misplaced.

● **The West will give up the only time-tested deterrent to chemical first-use — the ability to retaliate in kind.** Should a global ban on CW be reached, Western nations will faithfully adhere to their commitments not to produce or stockpile chemical weapons. In so doing, they will eliminate the single, proven disincentive to chemical attack by future aggressors.

The argument is sometimes made that such an outcome will not matter, that the United States will retain the ability to respond to chemical attack with devastating conventional or nuclear retaliation. While the United States almost certainly will have such capabilities, it is not clear that they will be effective deterrents to chemical attack. In the first place, there are real — and understandable — inhibitions to nuclear retaliation for non-nuclear attack. Moreover, the Iranians' ability to mete out punishing conventional devastation on Iraq certainly did not deter the Iraqis from making use of chemical weapons; to the contrary, it was that ability that prompted the latter to resort to CW attacks in the first place.

● **Perhaps most worrisome of all, in the aftermath of a CW ban, Western countries will also likely deemphasize investments in chemical *defensive* gear.** As has been the case with defense against biological warfare, it will almost certainly prove impossible to maintain a vigorous program for protecting against and counteracting chemical attack once no one is supposed to be able to mount such an attack. In fact, *even in the face of current massive CW threats from the Soviet Union and other countries*, most NATO nations are woefully ill-prepared to defend even their troops — let alone their civilian populations — against chemical weapons.

In short, as much as one might wish it otherwise, a global ban on chemical weapons will not eliminate the problem of CW proliferation. It will, instead, simply make it more difficult for the United States to deter the use of such weapons against it and its allies. What is more, if that use does occur, its lethal effects will be greatly magnified by the degraded state of Western defenses likely to be induced by the false sense of security a ban inspires.

Other options (e.g., economic and other sanctions, redoubled efforts to shore up the existing ban on chemical first-use, export controls on chemical manufacturing technologies, etc.) should be vigorously pursued, given the genuine problem of CW proliferation. It would be more than a shame, however — it would be an irresponsible travesty — if, as in 1974, the United States were to forswear its right to a given military capability in the vain hope that others would follow suit.

WILLIAM F. BURNS
MAJOR GENERAL, US ARMY (RET)
DIRECTOR
US ARMS CONTROL AND DISARMAMENT AGENCY

It is a pleasure to be here today and to have the opportunity to contribute to this Committee's work on a topic of certain interest to all of us. Issues of chemical weapons use and proliferation, and chemical weapons arms control, today occupy international attention in a way they have not done since the First World War.

The recent reoccurrence of chemical weapons use, and revelations that Libya is constructing a major chemical weapons production facility with the help of some Western companies, present an urgent challenge to the family of nations. The United States feels that challenge particularly keenly, because of our position of world leadership. These hearings are part of the US response. I would like to review with you some other elements of our response.

On January 24, I appeared before the Senate Foreign Relations Committee to describe the results of last month's Paris Conference on chemical weapons use. This conference, first proposed by former President Reagan at the United Nations in September, was held January 7 through 11. It involved the participation of 149 states, more than half of whom were represented at the Foreign Minister level. Its objective was to reverse the rapid erosion of international norms against the illegal use of chemical weapons.

The Conference forged a powerful global consensus. In their plenary statements, and in the Conference's final declaration, which was adopted by consensus, the participating nations took a principled and forceful stand against the illegal use and dangerous spread of chemical weapons.

The final declaration of the Paris Conference reflected US objectives in several important elements:

- The Conference condemned the use of chemical weapons in violation of international law and existing norms.

- Participants stressed the importance and continuing validity of the 1925 Geneva Protocol.

- Participants expressed grave concern over the spread of chemical weapons, and called on all states to exercise restraint and act responsibly.

- The Conference confirmed full support for the UN Secretary General in carrying out his role for investigating reports of chemical weapons use, and confirmed participants' support for appropriate and effective steps taken by the United Nations in conformity with its charter in response to such use.

- Participants also supported humanitarian assistance to victims affected by chemical weapons.

- The Conference stressed the necessity of concluding a global, comprehensive, and effectively verifiable ban, of unlimited duration, on all chemical weapons. The declaration recognizes not only that a CW ban must be universal, calling on all states to become parties to a convention as soon as it is concluded, but also that effective verification is a sine qua non for agreement.

The fact that 149 states heeded the call to attend the Paris Conference and address themselves to the dangers of chemical weapons use and proliferation has put these issues on the international agenda. The result is that any first use of CW in the future will be severely condemned by the nations of the world -- and that their consciousness level has been raised with regard to the dangers of CW proliferation and the need for an effective global ban on such weapons.

All of the Paris Conference participants understood that the ultimate answer to the problems of chemical weapons proliferation and use must be agreement on a comprehensive, effectively verifiable, and truly global ban on chemical weapons. Negotiations to this end at the 40-nation Geneva Conference on Disarmament resumed this week. This work is based on a draft treaty that was submitted on behalf of the United States by then-Vice President George Bush in 1984. While the Conference on Disarmament has made considerable progress since 1984, there is still much to do.

Two key areas are globality -- ensuring that all CW-capable states participate in a ban -- and effective verification. The Paris Conference was an important step in dealing with the question of globality, since the consensus there will make it more difficult politically for nations to evade their responsibility to accept and support a future convention.

The question of verification, however, continues to represent a formidable challenge. In recent months, the attention of CD delegations increasingly has turned toward establishing the specific provisions of the most complex and difficult portions of the draft convention, those which deal with monitoring and verification.

- The negotiations are elaborating detailed provisions for on-site challenge inspection. Challenge inspection under a chemical weapons convention must address the fact that verification probably will be more difficult than it is even for a START agreement.

- Negotiators are attempting to deal effectively with the huge task of monitoring the international chemical industry to ensure no CW production would take place under the agreement. An important step in this area is the project of trial inspections in the chemical industry, which the US and more than a dozen other CD participants are carrying out to develop routine procedures that would be implemented under a convention.

- Additional work is under way on a complex regime for permitting synthesis of minute quantities of banned chemicals for medical and defensive research.

Verification is not the only area on which the CD is working. Negotiations also continue on other major outstanding issues, such as procedures to ensure the security of all parties during the ten-year period of stockpile destruction, and creation of an international body to implement and monitor a ban. That body should be technically competent, relatively free of political bias, and cost effective.

While we continue to negotiate a ban, we also must continue efforts to address the problems of the dangerous proliferation and illegal use of chemical weapons. The international community made a start in Paris; now we must follow up with effective, cooperative action.

- In Paris, former Secretary of State Shultz suggested that nations consider appropriate joint action in the event of future use of chemical weapons. We also have proposals from the Senate and House for sanctions against countries that use CW in violation of international law and corporations that assist non-CW states in gaining a chemical weapons capability. The Bush Administration is now developing its position with regard to such sanctions; the issue calls for a good deal of thought and careful work between the Executive and Legislative branches as well as among nations.

- There has also been enormous attention paid to the question of strengthening export controls on commerce in CW-related materials. Effective export control policies, coupled with the resources and commitment to enforce them, are a key component in any effort to curtail foreign assistance to would-be CW proliferators. The Federal Republic of Germany's recent decision to review and enhance its export control laws is a welcome step, and should be emulated by all those countries whose laws are insufficient in regulating CW-related commerce.

As part of the series of close US-FRG consultations on these matters, on February 2 Secretary Baker and I met separately with Economics Minister Haussmann, who described the new steps his country is planning in this area. Greater coordination among all industrialized nations is needed: we are considering ways, for example, that the coordination in the existing Australia Group could be strengthened and expanded.

- The US is a member of the small group of experts that is working on elaborating more detailed and efficient procedures to guide the UN Secretary General in case of future allegations of the use of chemical weapons. We are hoping to tighten up procedures so that the Secretary General, acting for the international community, will be able to react more quickly and decisively to any future use.

- Still to be considered are more ambitious ways in which nations could react jointly to the threat of chemical weapons use. As one example, Chapter VII of the United Nations Charter offers the possibility of coordinated action through the Security Council.

In all of this, we have remained in close touch with the Soviet Union. We cannot say that the USSR shares all of our goals in the area of chemical weapons, but there is a significant degree of coincidence of views nonetheless. This has provided a basis for future consultation and cooperation. The two countries regularly hold bilateral discussions in Geneva on chemical weapons negotiating issues; in addition separate consultations are conducted periodically on CW proliferation issues. I might add that under the latter heading, we have pressed the Soviets to use their influence with Libya to put a halt to its chemical weapons development program.

What I have just described is an ambitious agenda, if one considers past experience concerning the difficulty of fostering unified international action on a given problem, no matter how urgent that problem. Nevertheless, events to date encourage me to believe that most of the countries of this globe share a new realization of their obligations to act against the scourge of chemical weapons, and to work to prevent their future use.

The Arms Control and Disarmament Agency has a legislative mandate to disseminate information on arms control and disarmament issues to publics here and abroad. This applies especially to the problem of the dangerous proliferation and illegal use of chemical weapons. At the Paris Conference we witnessed intense interest on the part of citizens everywhere in the problems of CW proliferation and use. We saw a sense of satisfaction among many that the US was exercising its leadership role in this regard. To this end, ACDA is carrying on an active effort to alert audiences to the dangers of chemical and nuclear proliferation and the need for effectively verifiable agreements banning CW development, production, stockpiling, and use.

H. ALLEN HOLMES

ASSISTANT SECRETARY FOR POLITICO-MILITARY AFFAIRS

DEPARTMENT OF STATE

INTRODUCTION

Mr. Chairman, Members of the Senate Governmental Affairs Committee and its Subcommittee on Investigations:

I am pleased to have the opportunity to appear before you, following ACDA Director Burns, to discuss the U.S. policy on Chemical and Biological Weapons (CBW) arms control. General Burns has covered the recent Paris Conference on CW Use, and he has laid out for you the challenges we face at the negotiations in Geneva for a CW ban. I would like to focus my remarks on what we are doing about proliferation.

I must make clear to you that the new Administration is engaged in an urgent policy review in all areas of arms control, and thus what we say today is an outline of where we stand now.

The hearings today come at a portentious moment. We have recently witnessed a particularly disturbing and dangerous trend in the increasing proliferation and use of chemical weapons -- a trend we must try to reverse without delay. There is no more pressing arms control issue.

BACKGROUND

In the CBW arena today, there are two relevant international agreements, both of which have proven inadequate to prevent the proliferation and use of these weapons:

-- The 1925 Geneva Protocol, which prohibits the unlawful use in war of chemical and bacteriological weapons, but not their development, production, possession, or transfer; and

-- The 1972 Biological and Toxin Weapons Convention (BWC), which prohibits the development, production, stockpiling, acquisition, retention, and transfer of biological and toxin weapons.

The Paris Conference in January developed an international consensus to shore up again the Geneva Protocol prohibition against CW use. But that in itself is not enough. We will have to take effective steps against proliferation, a problem of high and growing proportions.

Twenty years ago, only five countries were estimated to possess chemical weapons. Today this figure has risen to about 20 countries that are developing chemical weapons capabilities.

In 1972, a small number of countries were known to possess a biological warfare capability; today at least ten countries are estimated to be working to achieve a BW capability.

Moreover, there is a serious East-West imbalance, as well as an increasingly dangerous North-South element, in the proliferation of CW capabilities.

-- The USSR now possesses the world's largest CW stockpile.

-- In addition, we have seen the rapid proliferation of CW capabilities in the most volatile regions of the Third World.

To deal with these problems, the U.S. has pursued a multifaceted policy:

-- Seeking to negotiate an effectively verifiable global ban on CW production and stockpiling;

-- Developing the essential parameters and procedures of the treaty verification regime;

-- Taking action to inhibit illegal CW use and proliferation;

-- Working with the Australia Suppliers Group, to curb exports in CW-related materials and technology; and

-- Consulting bilaterally with the Soviet Union to coordinate efforts to curb proliferation.

-- At the same time restoring the credibility of our CW deterrent by replacing aging unitary stocks with reduced numbers of binary weapons;

Let me deal with each of these in turn.

CW TREATY NEGOTIATIONS

General Burns has covered the details of the negotiations which have been underway at the 40-nation Conference on Disarmament (CD) in Geneva since 1971 on a comprehensive CW ban. I would like to discuss some of the problems which impinge on the negotiations, problems which we are addressing in our policy review. The draft treaty calls for a comprehensive, effectively verifiable and truly global ban not only on the use of chemical weapons but on their production, development, stockpiling, transfer, and acquisition. The ban would also require the total destruction of all existing CW stocks and production facilities.

In this context, we place considerable emphasis on bilateral consultations with the Soviet Union. In parallel with and in support of the multilateral negotiations at the CD itself, we have held ten rounds of discussions with the Soviets on a CW ban. During the last year, the Soviets have approached these bilateral consultations with a cooperative and businesslike attitude. They have begun to provide specific, constructive proposals in lieu of vague generalities.

Although significant progress has been made in the treaty negotiations, many critical issues remain unresolved. The Conference must still negotiate detailed provisions that will assure reliable verification; provide undiminished security for all parties to the agreement during the period of stockpile destruction; monitor the civil chemical industry, while protecting confidential proprietary information; and ensure the accession of all CW-possessor and CW-capable states.

EFFORTS TO DEVELOP AN EFFECTIVE VERIFICATION REGIME

The single most important technical issue remaining in the treaty negotiations is that of verification. There are some real difficulties in hammering out the details of an inspection regime, including both routine and mandatory challenge inspection procedures, to ensure nonproduction of CW at facilities declared for treaty purposes and to deter or detect clandestine production at undeclared facilities. We harbor no illusions that any easy solution is at hand or that absolute certainty in verification is achievable. Among the many critical problems which we must address are:

-- The ease with which chemical weapons could be produced clandestinely.

-- The difficulty of detecting clandestine CW stocks. A militarily significant stockpile could be concealed in a small area.

-- The fact that most chemicals and equipment required to produce CW agents have legitimate uses, for example, in the pharmaceutical and pesticide industries.

We must determine what measures will give us the degree of confidence we require for an effectively verifiable Treaty and the degree to which we can accept a truly intrusive inspection regime.

The U.S. draft treaty tabled at the CD in 1984 calls for an intrusive inspection regime. The Soviets have now accepted our position in principle, and this is the current basis for negotiation. We are working now to refine treaty language to ensure the protection under such a regime of sensitive facilities and information in both the national security domain and the private sector.

EFFORTS TO CURB CW PROLIFERATION AND USE

Given the potential dangers and stakes involved, the U.S. is taking all possible action to inhibit the use and further proliferation of chemical weapons, even as we pursue the goal of complete and verifiable elimination of chemical weapons.

A number of factors have fostered the proliferation of such weapons: they are relatively inexpensive, require little technological sophistication, and are generally produced from chemicals and technology with legitimate industrial applications.

CW proliferation itself constitutes a serious threat to world peace and increases the danger of use. There is an increasing risk that developing countries may be tempted to acquire and use chemical weapons to offset the real or perceived conventional and nuclear weapons capabilities of a rival. In addition, there is a distinct and increasing possibility of the use of chemical weapons by terrorists, especially given the confirmed possession of CW by states that support terrorism, such as Libya.

We are also seriously concerned about the increasing proliferation of missile technology and its possible application to CBW employment. The capability of hostile Third World states to exploit this technology to attack or threaten U.S. interests, or those of our allies, with chemical or biological weapons is a particularly disturbing development -- one which we are committed to curb. We continue to work closely with our partners in the Missile Technology Control Regime (MCTR) to prevent the spread of ballistic and cruise missile systems and technology.

The United States has taken actions unilaterally and in cooperation with others to inhibit the illegal use and further proliferation of chemical weapons while we seek to negotiate a global ban. Forty chemicals, some of which are related to the manufacture of chemical weapons, are subject to U.S. export controls. In addition, the United States has imposed export controls to deny particularly dangerous chemicals to Iraq, Iran, and Syria. All exports of any kind to Libya are prohibited.

The U.S. has taken diplomatic and political actions as well. Through diplomatic channels, the U.S. has expressed its condemnation to countries implicated in chemical and toxin weapons use. Publicly, the U.S. vigorously condemned CW use in the Gulf War as well as the subsequent use of it by Iraq against its Kurdish population. In addition, we have sponsored resolutions in the United Nations General Assembly condemning CW use in the Gulf War, and supported the UN Secretary General's decision to investigate reports of chemical weapons use.

Recently, as General Burns noted, at the Paris CW Use Conference, the US and 148 other nations reaffirmed our commitment to the 1925 Geneva Protocol and stressed our grave concern over the growing proliferation of CW. We achieved a consensus among the 149 states participating to, among other things:

-- Reaffirm the validity of the 1925 Geneva Protocol;

-- Condemn CW use;

-- Reaffirm the UN Secretary-General's role in investigating alleged violations of the Geneva Protocol; and

-- Urge countries to act with restraint in order to curb CW proliferation;

In addition, the validity of the Geneva Protocol was strengthened in Paris by ten countries announcing their accession or their intention to accede.

AUSTRALIA SUPPLIERS GROUP

Since 1985, the United States and 18 other industrialized nations have participated in periodic meetings to discuss cooperative measures to curb the proliferation of chemical weapons and their use in the Gulf War. The group has sought to ensure that chemical exports do not contribute to the illegal use and the dangerous proliferation of chemical weapons. Participating states have exchanged relevant information, have coordinated export controls on certain chemicals, and have developed a warning list which each country's chemical industry uses on a voluntary basis. The Chemical Warning List serves to help companies identify and avoid transactions which could assist other countries in the production of chemical weapons.

We are also working closely with our allies to halt the flow of material and technical assistance to the Libyan CW production facility at Rabta.

CONSULTATIONS WITH THE SOVIET UNION ON PROLIFERATION

In addition, United States and Soviet representatives consult regularly on efforts to prevent the proliferation of chemical weapons. We have held four bilateral experts meetings since 1986, the latest in Bern in December 1988. The Soviets, along with other Warsaw Pact countries, have imposed export controls on CW precursors listed in the draft treaty, but they are reluctant to control other important precursors. We seek through the mechanism of the consultations to influence the Soviets to impose the same export controls as the U.S.

BINARY MODERNIZATION PROGRAM

At the same time, it is imperative that we negotiate from a position of strength. The Binary Modernization Program is indispensable in this regard. While we proceed to destroy our aging unitary stocks, we are modernizing our CW deterrent and retaliatory capability with a reduced number of the safer binary munitions. It is instructive that the Soviets began to negotiate seriously only after the Congress' decision in 1986 to proceed with the modernization program. In the absence of an effectively verifiable global CW ban, we cannot afford to disarm unilaterally while the Soviets and others maintain their CW capabilities. Our major NATO allies understand and support this policy as well.

WHERE DO WE STAND?

Much remains to be done to stem the proliferation and use of chemical weapons. In our policy review we are looking at the following possibilities:

-- international harmonization of controls on exports of precursor chemicals;

-- greater involvement and commitment by the chemical industry in restraint and responsibility for commerce in CW-related materials and technology;

-- greater public awareness and condemnation of users of chemical weapons in violation of international agreements; and

-- more extensive approaches to those who purposefully or inadvertently use or abet the use or further proliferation of chemical weapons.

The Paris Conference created a momentum and expectations for progress in the negotiation of a comprehensive CW ban and in addressing the problems of proliferation and illegal use. Meanwhile, we have recently taken steps to accelerate our actions in the following areas:

UN Role:

As stated in the Paris Conference final document, the UN should be encouraged to exercise vigilance over the prohibition on CW use. If violated, the UN should make full use of the UNSYG's investigatory capabilities as well as the appropriate and effective steps contemplated in the UN Charter, including Chapter VII sanctions. We are working with the UN to increase the effectiveness of the UNSYG investigations.

CW Interdiction Group

We have recently up-graded a State-Intelligence Working Group established to ensure a coordinated effort to identify and halt the flow of CW materials, equipment, and technology, to certain countries such as Libya.

Verification Initiatives

We have undertaken a comprehensive research program to determine the parameters and procedures for an effective verification regime. The Administration may require additional funds to allow the verification research to proceed most expeditiously; e.g. at the national laboratories.

In support of CD efforts to develop an effective verification regime, our technical experts -- in concert with the Chemical Manufacturers Association -- have been working on a national trial inspection of a commercial chemical production facility, to test procedures for monitoring compliance under an eventual CW treaty. We plan to conduct the trial inspection during February and to present the results in Geneva later in the spring session.

SUMMARY AND CONCLUSIONS

I have attempted to provide the Committee a comprehensive overview of existing policy on CBW and of the major issues we face in addressing the dangers of increasing proliferation and resurgent use of these weapons. In summary, recent events have demonstrated dramatically that we can no longer address the CBW threat on a 'business as usual' basis.

We must tackle a number of tough problems, to ensure global application and universal compliance in an eventual treaty, and to ensure that our national security and the security of our allies, is protected. In the interim, we must try to arrest the proliferation of CBW and ensure that its use will not recur.

Our policy review will address these issues, and I wish to assure the Senate that the Administration has this issue at the top of its agenda.

PREPARED STATEMENT OF WILLIAM VON RAAB

MR. CHAIRMAN, I AM PLEASED TO BE APPEARING BEFORE YOU AND YOUR COMMITTEE TODAY TO DISCUSS THE ROLE OF THE UNITED STATES CUSTOMS SERVICE IN THE ENFORCEMENT OF EXPORT CONTROLS ON CHEMICAL AND BIOLOGICAL AGENTS AND RELATED MATERIAL AS IT IMPACTS ON THE NON-PROLIFERATION OF THEIR USE.

I LAST TESTIFIED BEFORE YOUR COMMITTEE IN MAY, 1982, ON EXPORT ENFORCEMENT ISSUES; SINCE THEN, THE U.S. CUSTOMS SERVICE HAS PLAYED AN ESSENTIAL ROLE IN THE ENFORCEMENT OF U.S. EXPORT CONTROL LAWS. OUR OPERATION EXODUS PROGRAM, INITIATED IN 1981, HAS EVOLVED FROM A BASIC, REACTIVE OPERATION TO A HIGHLY STRUCTURED, COMPLEX INVESTIGATIVE JURISDICTION. OPERATION EXODUS INVESTIGATIVE RESULTS HAVE ELEVATED THE U.S. CUSTOMS SERVICE TO AN UNPRECEDENTED LEVEL OF NATIONAL AND INTERNATIONAL ENFORCEMENT PROMINENCE. I REPORTED TO YOU THAT WE HAD 125 INSPECTORS, 50 SPECIAL AGENTS AND 25 SUPPORT PERSONNEL WORKING EXCLUSIVELY ON OPERATION EXODUS. CURRENTLY, WE HAVE 104 INSPECTORS, 300 AGENTS AND AN INDEPENDENT INTELLIGENCE BRANCH ASSIGNED FULL TIME TO OPERATION EXODUS. IN ADDITION, WE HAVE 5100 OTHER INSPECTORS AND MORE THAN 2800 ADDITIONAL SPECIAL AGENTS ASSIGNED TO OTHER DUTIES THAT CAN BE CALLED UPON AS THE NEED AND CIRCUMSTANCES ARISE.

WE ALSO HAVE 19 ESTABLISHED OVERSEAS OFFICES IN 15 FOREIGN COUNTRIES. EACH OF THOSE OFFICES ARE STAFFED WITH EXPERIENCED INVESTIGATORS WHO WORK WITH OUR COUNTERPARTS TO OBTAIN THE NECESSARY INFORMATION ON POTENTIAL VIOLATIONS. WE HAVE ESTABLISHED SPECIALIZED TRAINING PROGRAMS FOR BOTH INSPECTORS AND SPECIAL AGENTS IN THIS FIELD. WE HAVE ALSO INCLUDED INTRODUCTORY TRAINING COURSES INTO ALL OF OUR GENERAL TRAINING PROGRAMS FOR INSPECTORS, SPECIAL AGENTS, AND SUPERVISORS. THESE EFFORTS RESULTED IN OVER 1,100 ARRESTS AND 7,000 SEIZURES VALUED OVER $511,000,000.

THE EXODUS PROGRAM ENCOMPASSES ALL POTENTIAL EXPORT VIOLATIONS. WE HAVE NOT DEDICATED SPECIFIC RESOURCES TO ANY ONE ASPECT OF EXPORT CONTROL, INCLUDING CHEMICAL AND BIOLOGICAL WARFARE, BUT INSTEAD WE ATTACK THE PROBLEM AS A WHOLE. WE CHOSE TO DO THIS BECAUSE THE METHODS AND DIVERSION ROUTES USED ARE NOT UNIQUE TO ANY PARTICULAR TYPE OF MERCHANDISE BEING ILLEGALLY EXPORTED, AND THE SKILLS AND EXPERTISE THAT OUR PEOPLE HAVE DEVELOPED TRANSCEND ALL TYPES OF VIOLATIONS. FOR THIS REASON, SOME OF MY COMMENTS TODAY MAY NOT BE SPECIFICALLY RELATED TO CHEMICAL AND BIOLOGICAL WARFARE, BUT CONCERN THE ENTIRE EXPORT ENFORCEMENT PROGRAM.

HOWEVER, I ASSURE YOU THAT ALL OF OUR EFFORTS, IN BOTH THE INSPECTION AND INVESTIGATIVE AREAS, ARE AIMED AT DISCOVERING AND PREVENTING AS MANY ILLEGALLY EXPORTED SHIPMENTS OF CHEMICAL AND BIOLOGICAL WARFARE AGENTS AS POSSIBLE AND TO BRING THOSE RESPONSIBLE FOR SUCH ACTIONS TO JUSTICE. ADDITIONALLY, WE HAVE ESTABLISHED PROJECT GEMINI, WHICH IS OUR INDUSTRY AWARENESS PROGRAM DESIGNED TO INFORM INDUSTRY OF EXPORT CONTROLS AND SOLICIT THEIR COOPERATION IN OUR ENDEAVORS.

I ALSO WANT TO MAKE IT CLEAR THAT WE ARE AN ENFORCEMENT AGENCY AND, AS SUCH, ARE NOT INVOLVED IN THE LICENSING DECISIONS IN EXPORT CONTROL.

THE PREVENTION OF SHIPMENTS TO ILLICIT END-USERS OF CHEMICAL/BIOLOGICAL AGENTS IS A COOPERATIVE EFFORT REQUIRING THE INVOLVEMENT BY ALL THOSE CONCERNED, INCLUDING THE CHEMICAL/BIOLOGICAL INDUSTRY. THE EXPORT CONTROLS CURRENTLY IN PLACE PROVIDE A RESTRICTION HONORED BY THE LAW_ABIDING FIRMS, BUT DO NOT DETER THE WITTING VIOLATOR WHO SEES A HANDSOME PROFIT IF HIS GAMBLE IS SUCCESSFUL. AS RECENTLY PUBLICIZED BY THE NEWS MEDIA, THE U.S. CUSTOMS SERVICE HAS MAJOR ONGOING INVESTIGATIONS

WHICH HAVE REACHED INTERNATIONAL PROPORTIONS INVOLVING THE DIVERSION OF PRECURSORS USED IN CHEMICAL WARFARE BY THIRD WORLD COUNTRIES. U.S. MANUFACTURERS HAVE BEEN TARGETED BY INTERNATIONAL BROKERS AND MIDDLEMEN RETAINED BY THESE PROLIFERATION COUNTRIES AND ARE USING VARIOUS TECHNIQUES TO CIRCUMVENT THE EXISTING EXPORT CONTROLS APPLIED BY THE UNITED STATES. I WOULD LIKE TO BRIEFLY DISCUSS A FEW OF THESE INVESTIGATIONS TO ILLUSTRATE THE COMPLEXITY INVOLVED.

ALCOLAC INTERNATIONAL AND NU KRAFT MERCANTILE CORPORATION

THE UNITED STATES CUSTOMS SERVICE INITIATED AN INVESTIGATION IN APRIL, 1988, INTO EXPORTS BY ALCOLAC INTERNATIONAL, INC., A BALTIMORE MANUFACTURER OF THE CHEMICAL THIODIGLYCOL, A PRECURSOR FOR MUSTARD GAS.

THE INVESTIGATION LED TO THE ARREST IN JULY, 1988, OF PETER WALASCHEK, A GERMAN NATIONAL WHO PURCHASED THREE SHIPMENTS OF THIODIGLYCOL BETWEEN 1987 AND 1988 FOR SHIPMENT TO GREECE AND SINGAPORE, AND THEN REEXPORTED THEM TO IRAN. WALASCHEK, WHO REPRESENTED THE WEST GERMAN FIRMS COLIMEX AND CHEMCO GMBH, WAS ARRESTED AFTER CUSTOMS AGENTS IN BALTIMORE BECAME SUSPICIOUS OF

HIS THIRD PURCHASE, AN ORDER OF 120 TONS OF THIODIGLYCOL, AND DIRECTED CUSTOMS INSPECTORS IN NORFOLK, VIRGINIA, TO SEIZE THE CHEMICAL AND SUBSTITUTE WATER IN ITS PLACE. THE AGENTS ALLOWED THE SHIPMENT TO PROCEED TO SINGAPORE, ITS SUPPOSED DESTINATION. FEDERAL AGENTS IN ASIA TRACKED THE SHIPMENT AS IT WAS TRANSSHIPPED FROM SINGAPORE TO KARACHI, PAKISTAN, AND THEN TO BANDAR ABBAS, IRAN, WHERE IT ARRIVED ON JULY 1, 1988.

ON JULY 5, 1988, SEARCH WARRANTS WERE EXECUTED AT THREE MARYLAND OFFICES OF ALCOLAC INTERNATIONAL. BASED ON INFORMATION OBTAINED FROM THESE SEARCHES AND ADDITIONAL DOCUMENTS SEIZED IN GERMANY, AN INDICTMENT WAS RETURNED AGAINST WALASCHEK BY A FEDERAL GRAND JURY IN BALTIMORE. WALASCHEK WAS LURED INTO THE UNITED STATES AND ARRESTED ON JULY 27, 1988, AT BALTIMORE-WASHINGTON INTERNATIONAL AIRPORT. HE LATER PLEAD GUILTY TO VIOLATING THE EXPORT ADMINISTRATION ACT BY REEXPORTING THIODIGLYCOL FROM SINGAPORE TO PAKISTAN, AND FROM PAKISTAN TO IRAN. WALASCHEK ADMITTED PURCHASING THE CHEMICAL AT THE DIRECT REQUEST OF SAYED KHARIM ALI SOBHANI, AN IRANIAN DIPLOMAT STATIONED AT THE IRANIAN EMBASSY IN BONN. IN DECEMBER, 1988, WALASCHEK FLED FROM A HALFWAY HOUSE WHILE AWAITING SENTENCING AND IS CURRENTLY A FUGITIVE IN WEST GERMANY.

THE ALCOLAC INVESTIGATION FURTHER REVEALED THAT ALCOLAC EXPORTED FOUR SHIPMENTS OF THIODIGLYCOL THROUGH A NEW YORK COMPANY, KNOWN AS NU KRAFT MERCANTILE CORPORATION AND INDUSTRIAL PROCUREMENT CORPORATION. THOSE SHIPMENTS WERE EXPORTED AND SUBSEQUENTLY DIVERTED TO IRAQ.

SEARCH WARRANTS WERE EXECUTED ON JANUARY 27, 1989, ON NU KRAFT MERCANTILE CORPORATION, BROOKLYN, NEW YORK, AND ARREST WARRANTS WERE UNSEALED ON JANUARY 30, 1989, FOR FRANS VAN ANRAAT, A DUTCH CITIZEN, AND NICHOLAS J. DEFINO, A RESIDENT OF NEW JERSEY. EACH WERE CHARGED WITH THREE COUNTS OF ILLEGALLY REEXPORTING THIODIGLYCOL FROM ANTWERP, BELGIUM, TO JORDAN; THREE COUNTS OF FALSE STATEMENTS ON THE SHIPPER'S EXPORT DECLARATIONS FILED WITH THE UNITED STATES CUSTOMS SERVICE; AND ONE COUNT OF CONSPIRACY TO VIOLATE THE EXPORT ADMINISTRATION ACT. VAN ANRAAT WAS ARRESTED BY ITALIAN AUTHORITIES ON JANUARY 26, 1989, IN MILAN, ITALY, AND IS BEING HELD PENDING EXTRADITION. DEFINO SURRENDERED TO FEDERAL OFFICIALS IN BALTIMORE ON JANUARY 30, 1989, AND WAS RELEASED ON $500,000 BAIL.

THE INVESTIGATION DISCLOSED THAT BETWEEN NOVEMBER, 1987, AND MARCH, 1988, NU KRAFT MERCANTILE CORPORATION, OF WHICH DEFINO IS A PRINCIPAL, PURCHASED FOUR SHIPMENTS OF THIODIGLYCOL FROM ALCOLAC, EACH WEIGHING IN EXCESS OF 100 TONS. THE SHIPMENTS WERE FORWARDED TO ANTWERP, BELGIUM, WHERE THEY WERE TO BE FORWARDED BY VAN ANRAAT, NU KRAFT'S EUROPEAN AGENT, TO HIS CUSTOMERS IN WESTERN EUROPE. AT LEAST THREE OF THE FOUR SHIPMENTS WERE TRANSSHIPPED FROM ALCOLAC TO JORDAN RATHER THAN TO WESTERN EUROPE, AS DEFINO AND VAN ANRAAT HAD REPRESENTED.

ALCOLAC INTERNATIONAL ENTERED INTO A PLEA AGREEMENT WITH THE U.S. ATTORNEY'S OFFICE IN THE DISTRICT OF MARYLAND AND ON FEBRUARY 10, 1989, PLEAD GUILTY TO ONE COUNT OF KNOWINGLY VIOLATING THE EXPORT ADMINISTRATION ACT FOR THE APRIL 20, 1988, SALE OF THIODIGLYCOL TO COLIMEX GMBH OF WEST GERMANY.

ON FEBRUARY 13, 1989, LESLIE HINKLEMAN, EXPORT MANAGER, ALCOLAC INTERNATIONAL, PLEAD GUILTY TO ONE COUNT OF MAKING A FALSE STATEMENT AND AGREED TO COOPERATE FULLY WITH THE INVESTIGATION.

SENTENCING OF BOTH PARTIES HAS BEEN DELAYED UNTIL THE FULL EXTENT OF THEIR COOPERATION HAS BEEN DETERMINED.

ON MARCH 23, 1989, THE FEDERAL GRAND JURY IN THE DISTRICT OF MARYLAND, RETURNED TWO SEPARATE SUPERSEDING INDICTMENTS. THE FIRST WAS A SUPERSEDING 12-COUNT INDICTMENT CHARGING SOBHANI AND WALASCHEK WITH VIOLATIONS OF THE EXPORT ADMINISTRATION ACT FOR

MAKING FALSE STATEMENTS AND MONEY LAUNDERING. WALASCHEK IS ALSO CHARGED WITH FAILING TO APPEAR AT HIS SENTENCING IN THE U.S. DISTRICT COURT FOR MARYLAND.

THE SECOND INDICTMENT, ALSO 12 COUNTS, CHARGES VAN ANRAAT WITH VIOLATIONS OF THE EXPORT ADMINISTRATION ACT, FOR MAKING FALSE STATEMENTS AND MONEY LAUNDERING.

VAN ANRAAT IS CURRENTLY INCARCERATED IN MILAN, ITALY, PENDING EXTRADITION TO MARYLAND FOR PROSECUTION. WALASCHEK IS A FUGITIVE AND EFFORTS ARE BEING MADE BY THE DEPARTMENT OF JUSTICE TO HAVE HIM EXTRADITED TO THE U.S. OR TRIED IN WEST GERMANY. SOBHANI'S CURRENT WHEREABOUTS ARE UNKNOWN.

JUWHAN YUN d/b/a KOMEX INTERNATIONAL

ON JANUARY 12, 1989, U.S. CUSTOMS AGENTS ARRESTED JUWHAN YUN, PRESIDENT OF KOMEX INTERNATIONAL, SHORT HILLS, NEW JERSEY, AND CHARGED HIM WITH CONSPIRACY TO EXPORT THE NERVE GAS, SARIN, IN VIOLATION OF THE ARMS EXPORT CONTROL ACT. YUN IS A U.S. CITIZEN OF KOREAN DESCENT. ALSO CHARGED IN THE CONSPIRACY WAS CHARLES CAPLAN, A BRITISH CITIZEN AND ASSOCIATE OF YUN. CAPLAN WAS NOT ARRESTED AND REMAINS A FUGITIVE.

THIS ARREST WAS THE RESULT OF A SEVEN-MONTH UNDERCOVER INVESTIGATION CONDUCTED BY THE SPECIAL AGENT IN CHARGE, NEWARK. YUN BEGAN TO NEGOTIATE WITH A CUSTOMS UNDERCOVER AGENT TO

PURCHASE AND ILLEGALLY EXPORT SARIN IN NOVEMBER OF 1988. SARIN IS DESCRIBED AS A COLORLESS, ODORLESS GAS THAT CAN KILL BY INHALATION, INGESTION, OR ABSORPTION THROUGH THE SKIN. YUN WAS ATTEMPTING TO PURCHASE 500 MARK 94 BOMBS, EACH CONTAINING 108 POUNDS OF SARIN. SARIN IS CONSIDERED LETHAL IN DOSAGES AS LOW AS 1.7 GRAMS. THE EXPORT OF SARIN FROM THE U.S. IS CONTROLLED UNDER CATEGORY XIV(a) OF THE U.S. MUNITIONS LIST. ITS EXPORTATION REQUIRES A LICENSE ISSUED BY THE OFFICE OF MUNITIONS CONTROL, U.S. DEPARTMENT OF STATE.

DURING THE INVESTIGATION, YUN ALSO ATTEMPTED TO PURCHASE L.A.W. ROCKETS, TOW MISSILES, STINGER MISSILES, AND OTHER MUNITIONS LIST ITEMS. THE INVESTIGATION REVEALED THAT YUN WAS FAMILIAR WITH OFFICE OF MUNITIONS CONTROL LICENSING REQUIREMENTS AND WAS ATTEMPTING TO OBTAIN FALSE "END-USE CERTIFICATES" TO CONCEAL THE ULTIMATE DESTINATION OF THE SARIN AND OTHER ITEMS.

ON JANUARY 20, 1989, A GRAND JURY SITTING IN THE DISTRICT OF NEW JERSEY, RETURNED A TWO-COUNT INDICTMENT AGAINST JUWHAN YUN AND CHARLES CAPLAN CHARGING THEM WITH CONSPIRACY TO EXPORT SARIN IN VIOLATION OF THE ARMS EXPORT CONTROL ACT. BASED UPON A RULING BY THE THIRD CIRCUIT COURT OF APPEALS, YUN HAS BEEN DETAINED PENDING TRIAL. A TRIAL DATE HAS BEEN SET FOR MAY 1, 1989.

THE COMPLEXITY AND SENSITIVITY OF THIS INVESTIGATION REQUIRED THE COOPERATION OF A NUMBER OF U.S. AND FOREIGN LAW ENFORCEMENT AGENCIES. ASSISTANCE WAS PROVIDED BY THE U.S. DEPARTMENT OF DEFENSE, U.S. ARMY AND NAVY, THE NAVAL INVESTIGATIVE SERVICE, HER MAJESTY'S CUSTOMS AND EXCISE (U.K), AND THE U.S. CUSTOMS SERVICE OFFICES IN LONDON, PARIS, SEOUL, HONOLULU, AND LOS ANGELES.

IN ADDITION TO THE SPECIFIC INVESTIGATIONS I HAVE JUST DESCRIBED, THE U.S. CUSTOMS SERVICE IS CURRENTLY PARTICIPATING IN THREE (3) DIFFERENT U.S. INTERAGENCY WORKING GROUPS CONCERNING THE EXPORT CONTROL OF CHEMICAL AND BIOLOGICAL AGENTS. THE GROUPS ARE BEING CHAIRED BY THE DEPARTMENT OF STATE WITH PARTICIPATION BY OTHER CONCERNED U.S. AGENCIES.

IN FURTHERANCE OF INTERAGENCY RELATIONS, OUR OPERATION EXODUS COMMAND CENTER PERFORMS A COMMUNICATION AND COORDINATION FUNCTION IN SUPPORT OF THE REGULATORY AND ENFORCEMENT RESPONSIBILITIES OF THE VARIOUS U.S. CUSTOMS SERVICE COMPONENTS INVOLVED IN EXPORT CONTROL. THE COMMAND CENTER PERSONNEL ASSIST OUR FIELD ELEMENTS ON QUESTIONS OF EXPORT REGULATIONS AND THE LICENSABILITY OF COMMODITIES AND TECHNICAL DATA INCLUDING CHEMICAL AND BIOLOGICAL WARFARE ITEMS.

THE COMMAND CENTER COMMUNICATES WITH LICENSING AUTHORITIES IN THE DEPARTMENTS OF STATE AND COMMERCE THROUGH CUSTOMS OFFICERS ASSIGNED FULL-TIME TO LIAISON POSITIONS WITH OFFICE OF MUNITIONS CONTROL (STATE) AND THE BUREAU OF EXPORT ADMINISTRATION (COMMERCE). THE COMMAND CENTER ALSO HAS DIRECT CONTACTS WITH THE DEPARTMENT OF ENERGY AND THE DEPARTMENT OF TREASURY'S OFFICE OF FOREIGN ASSETS CONTROL ON LICENSING MATTERS AND INTERPRETATION OF THEIR REGULATIONS. INDUSTRY SOURCES, THE INTELLIGENCE COMMUNITY, OTHER ENFORCEMENT AGENCIES, AND VARIOUS OTHER DATA BASES ARE ALSO AT THEIR DISPOSAL.

OUR STRATEGIC INVESTIGATIONS DIVISION MAINTAINS LIAISON OFFICERS WITH THE DEPARTMENTS OF DEFENSE AND STATE AND THE FBI. IN ADDITION, OUR INTELLIGENCE DIVISION PARTICIPATES WITH ALL INTERAGENCY INTELLIGENCE COMMITTEES REGARDING EXPORT CONTROL INCLUDING CHEMICAL AND BIOLOGICAL WARFARE MATTERS.

OUR FOREIGN ATTACHE OFFICES ENJOY PRODUCTIVE WORKING RELATIONSHIPS WITH THEIR MANY COUNTERPARTS AND OTHER ENFORCEMENT-ORIENTED ORGANIZATIONS IN THE COUNTRIES IN WHICH THEY SERVE REPRESENTING THE UNITED STATES. A FEW EXAMPLES OF THIS COHESIVE RELATIONSHIP ARE AS FOLLOWS:

A STATEMENT WAS MADE BY A COMMITTEE MEMBER DURING THE 1982 HEARINGS INDICATING THAT THE PROBABILITY OF BRINGING CRIMINALS LIKE WERNER J. BRUCHHAUSEN TO JUSTICE WOULD BE A DIFFICULT TASK. I AM PLEASED TO ANNOUNCE THAT THROUGH THE INCREASED ENFORCEMENT EFFORTS OF OUR OVERSEAS OFFICES THAT WE HAVE ACCOMPLISHED HIS ARREST, EXTRADITION, PROSECUTION, AND INCARCERATION FOR U.S. EXPORT VIOLATIONS. BRUCHHAUSEN IS CURRENTLY SERVING A 15-YEAR SENTENCE.

THE SURFACING OF THE RABTA CHEMICAL WEAPONS FACILITY IN LIBYA AND THE INVOLVEMENT OF WEST GERMAN FIRMS SUPPLYING CHEMICAL AND BIOLOGICAL WARFARE MATERIALS TO VARIOUS THIRD WORLD COUNTRIES PUT OUR CUSTOMS ATTACHE, BONN, IN THE FOREFRONT OF THIS ARENA. OUR ATTACHE, BONN, UNDER THE AUSPICES OF THE U.S.-FRG CUSTOMS MUTUAL ASSISTANCE AGREEMENT, WORKED CLOSELY WITH ITS FRG COUNTERPARTS IN INVESTIGATING SUSPECTED ILLEGAL EXPORTS OF CHEMICAL WARFARE MATERIALS. THE BONN OFFICE, AND FRG CUSTOMS ALSO PROVIDED INVESTIGATIVE ASSISTANCE TO ONE OF OUR DOMESTIC OFFICES WHICH SUCCESSFULLY INVESTIGATED AND PROSECUTED PETER WALASCHEK, IN CONNECTION WITH THE PREVIOUSLY MENTIONED ALOCOLAC INVESTIGATION.

THE CUSTOMS ATTACHE, PARIS, HAS A WORKING RELATIONSHIP WITH ITS FOREIGN COUNTERPARTS WHICH FULLY ALLOWS AND PROMOTES A FRUITFUL EXCHANGE OF INFORMATION REGARDING ANY REQUEST FOR INVESTIGATION IN THIS AREA. MOST RECENTLY THIS OFFICE ACTIVELY PURSUED AN INVESTIGATION ORIGINATING FROM ONE OF OUR DOMESTIC OFFICES WHERE THE COOPERATION FROM FRENCH AND BRITISH AUTHORITIES WAS ESSENTIAL TO THE INVESTIGATION. THE INVESTIGATION INVOLVED THE PREVIOUSLY MENTIONED SARIN INVESTIGATION. THE INVESTIGATION DISCLOSED THAT HE CONSPIRED WITH A BRITISH CITIZEN TO DIVERT THE SHIPMENT.

THE CUSTOMS ATTACHE, ROME, HAS BEEN VERY AGGRESSIVE IN THE EXTRADITION OF VIOLATORS OF U.S. EXPORT LAWS. AT THE BEHEST OF ONE OF OUR DOMESTIC OFFICES, ROME LOCATED AN INDIVIDUAL KNOWN TO BE A CONSPIRATOR IN THE PROCUREMENT AND RE-SALE OF CHEMICAL WEAPONS TO LIBYA AND HAD AN ARREST WARRANT EXECUTED IN ITALY. COOPERATION BETWEEN U.S. CUSTOMS AND OUR ITALIAN COUNTERPARTS, THE GUARDIA DI FINANZA AND THE QUESTURA, WAS EXCEPTIONAL.

THE COUNTRIES WITH WHICH U.S. CUSTOMS MAINTAINS RELATIONSHIPS HAVE PROVIDED THE UTMOST COOPERATION IN OUR INVESTIGATIONS AND

EXPRESSED WILLINGNESS TO ASSIST IN ANY MANNER. THIS REFLECTS ON THE PROFESSIONAL LIAISON PROGRAMS ESTABLISHED BY OUR INDIVIDUAL ATTACHE OFFICES AND THE MUTUAL RESPECT THAT WE HAVE SHOWN OUR COUNTERPARTS IN RETURN. THE CONSTANT EXCHANGE OF INTELLIGENCE AND INVESTIGATIVE INFORMATION IS LIMITED ONLY BY EACH COUNTRY'S OWN LAWS AND REGULATIONS. WE HAVE ESTABLISHED CUSTOMS-TO-CUSTOMS MUTUAL ASSISTANCE AGREEMENTS WITH 9 FOREIGN SERVICES AND ARE IN THE PROCESS OF ESTABLISHING 12 ADDITIONAL MOU'S. IN ADDITION, AS MEMBERS OF THE INTERNATIONAL CUSTOMS COOPERATION COUNCIL WHICH CONSISTS OF APPROXIMATELY 108 FOREIGN COUNTRIES, WE HAVE A NATURAL AVENUE FOR THE EXCHANGE OF INVESTIGATIVE INFORMATION AND COOPERATION. IN FACT, WE ARE THE ONLY U.S. LAW ENFORCEMENT AGENCY WITH NATURAL ENFORCEMENT COUNTERPARTS IN EVERY COUNTRY IN THE WORLD. OUR 200 YEAR HISTORY OF EFFECTIVELY WORKING WITH OUR COUNTERPARTS ON INTERNATIONAL INVESTIGATIVE MATTERS IS THE REASON WE WERE GRANTED SOLE OVERSEAS INVESTIGATIVE JURISDICTION BY CONGRESS IN THE EAA OF 1985.

WE HAVE MADE SIGNIFICANT PROGRESS IN THE AREA OF EXPORT ENFORCEMENT INCLUDING CHEMICAL AND BIOLOGICAL WARFARE ITEMS.

THE CUSTOMS SERVICE, AT ALL LEVELS, WILL CONTINUE ITS EFFORTS TO STEM THE PROLIFERATION OF THESE CHEMICAL PRECURSORS AND BIOLOGICAL AGENTS FROM ILLEGALLY LEAVING THE UNITED STATES.

STATEMENT BY JAMES LEMUNYON
DEPUTY ASSISTANT SECRETARY OF COMMERCE
FOR EXPORT ADMINISTRATION
ON CHEMICAL AND BIOLOGICAL AGENTS EXPORT CONTROLS
BEFORE THE SENATE
GOVERNMENTAL AFFAIRS COMMITTEE
MAY 2, 1989

GOOD MORNING MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE. THANK YOU FOR THE OPPORTUNITY TO TESTIFY ON EXPORT CONTROLS RELATED TO CHEMICAL AGENTS PRECURSORS AND CERTAIN BIOLOGICAL AGENTS. THE COMMERCE DEPARTMENT'S BUREAU OF EXPORT ADMINISTRATION (BXA) IS THE AGENCY RESPONSIBLE FOR CONTROLLING EXPORTS OF CHEMICAL AND BIOLOGICAL COMMODITIES WITH PRIMARILY COMMERCIAL END-USES. WE COMMONLY REFER TO COMMERCIAL ITEMS THAT MAY ALSO HAVE USES INVOLVING WEAPONS AS "DUAL USE" ITEMS.

THE AUTHORITY OF THE COMMERCE DEPARTMENT TO CONTROL THE EXPORT OF CHEMICAL PRECURSORS AND BIOLOGICAL AGENTS IS PROVIDED IN SECTION 6 OF THE EXPORT ADMINISTRATION ACT. THIS ACT SPECIFIES THAT CERTAIN ITEMS MAY BE EXPORTED ONLY AFTER AN APPLICATION IS RECEIVED, EXAMINED AND APPROVED BY BXA.

WE EXECUTE THIS LAW WITH GREAT CARE, MINDFUL OF THE POSSIBLE CONSEQUENCES IF CERTAIN CHEMICAL AGENT PRECURSORS AND BIOLOGICAL AGENTS GET IN THE WRONG HANDS, AS WELL AS THE CONSEQUENCES FOR U.S. INDUSTRY IF OUR CONTROLS ARE UNNECESSARILY BURDENSOME.

I WOULD LIKE TO BEGIN BY CLARIFYING A FEW POINTS ABOUT CHEMICAL AGENT PRECURSORS AND BIOLOGICAL AGENTS AND GIVE YOU AN IDEA OF OUR EXPORT CONTROL PROGRAM.

BACKGROUND:

THE CHEMICALS THAT HAVE BEEN IDENTIFIED TO DATE AS POSSIBLE PRECURSORS TO CHEMICAL AGENTS AS WELL AS BIOLOGICAL AGENTS WITH USES IN BIOLOGICAL WEAPONS DEVELOPMENT, ARE CONTROLLED FOR PURPOSE OF ACHIEVING OUR U.S. FOREIGN POLICY OBJECTIVES. THE CHEMICALS WE CONTROL ARE VERY COMMON AND CAN BE USED IN SUCH PRODUCTS AS PAINT THINNER, EMULSIFIERS AND FERTILIZER PRODUCTION. THEY MUST UNDERGO A CHEMICAL REACTION WITH OTHER CHEMICALS TO PRODUCE CHEMICAL ~~WEAPONS~~ AGENTS. THERE ARE COUNTLESS LEGITIMATE COMMERCIAL APPLICATIONS FOR THESE CHEMICALS AS WELL AS WIDESPREAD FOREIGN AVAILABILITY. HENCE, IT IS CRITICAL THAT EXPORT CONTROLS ALSO BE APPLIED BY OTHER NATIONS THAT HAVE INDIGENOUS SOURCES OF THE SAME PRODUCTS. OTHERWISE, U.S. EXPORTERS ARE PLACED AT A COMPETITIVE DISADVANTAGE WITHOUT ACHIEVING U.S. FOREIGN POLICY OBJECTIVES.

IN FACT, THE CHEMICAL INDUSTRY IS THE UNITED STATES' LARGEST INTERNATIONAL TRADING INDUSTRY. TOTAL SHIPMENTS BY THIS INDUSTRY REACHED $238 BILLION IN 1988 -- A $12.7 BILLION POSITIVE TRADE BALANCE. THE INDUSTRY EMPLOYS 1.1 MILLION AMERICANS.

CURRENT EXPORT CONTROLS APPLY TO 40 OF AN ESTIMATED 20,000 COMMERCIALLY TRADED CHEMICALS AND CHEMICAL PRODUCTS. IN 1988, WE RECEIVED APPROXIMATELY 1800 INDIVIDUAL VALIDATED LICENSE APPLICATIONS, COVERING ABOUT $68 MILLION IN EXPORTS.

IN COMPARISON TO CHEMICAL EXPORTS THE TRADE IN BIOLOGICAL PRODUCTS IS CONSIDERABLY SMALLER. IN 1988, WE RECEIVED APPROXIMATELY 600 APPLICATIONS FOR INDIVIDUAL VALIDATED LICENSES REPRESENTING $600,000 IN EXPORTS. UNLIKE CHEMICAL AGENT PRECURSORS WHICH ARE SHIPPED IN BULK QUANTITY FOR INDUSTRIAL USES, BIOLOGICAL PRODUCTS ARE SHIPPED IN SMALL QUANTITIES AND OFTEN FOR RESEARCH PURPOSES. IN ADDITION, SOME OF THE MOST LETHAL BIOLOGICAL AGENTS CAN BE CULTURED FROM READILY AVAILABLE LAB SPECIMENS. THE BIOLOGICAL INDUSTRY IS DOMINATED BY RESEARCH ORIENTED FIRMS, FREQUENTLY WITH STRONG TIES TO MAJOR UNIVERSITIES. MOST U.S. MANUFACTURERS OF BIOLOGICAL PRODUCTS ARE SMALL AND INDEPENDENT, AS ARE PRODUCERS IN OTHER COUNTRIES.

LICENSING:

I WOULD NOW LIKE TO TOUCH ON THE SCOPE AND OPERATION OF COMMERCE'S EXPORT LICENSING OPERATION, GIVE YOU AN UPDATE ON OUR OWN ENFORCEMENT EFFORTS, AND OUTLINE THE STEPS WE ARE TAKING WITH OTHER U.S. AGENCIES TO HELP PREVENT PROLIFERATION OF CHEMICAL AND BIOLOGICAL WEAPONS.

OF THE 40 CHEMICAL AGENT PRECURSORS ON THE CONTROL LIST, ALL REQUIRE A VALIDATED LICENSE FOR EXPORT TO CUBA, VIETNAM, CAMBODIA, NORTH KOREA, IRAN, IRAQ, SYRIA AND LIBYA AND ARE AUTOMATICALLY DENIED.

LICENSE APPLICATIONS FOR EXPORTS TO OTHER DESTINATIONS ARE REVIEWED ON THE BASIS OF END-USE AND END-USER. EXPORTS FOR COMMERCIAL USERS ARE GENERALLY APPROVED UNLESS THERE IS A REASON TO BELIEVE THAT THE EXPORT IS INTENDED FOR CHEMICAL OR BIOLOGICAL WEAPONS.

OTHER COUNTRIES HAVE AGREED TO CONTROL THESE SAME CHEMICALS THROUGH AN INFORMAL ORGANIZATION KNOWN AS THE AUSTRALIAN GROUP. THIS GROUP INCLUDES THE MAJOR WESTERN MANUFACTURERS OF THE chemicals of concern in this area ~~PARTICIPATION FROM REPRESENTATIVES OF THE NATO COUNTRIES PLUS AUSTRALIA, NEW ZEALAND, JAPAN, IRELAND AND SWITZERLAND~~. THE AUSTRALIAN GROUP IS AN INFORMAL BODY THAT OPERATES ON THE BASIS OF CONSENSUS WITH THE OBJECTIVE OF PREVENTING THE ILLEGAL USE AND PROLIFERATION OF CHEMICAL WEAPONS.

IN MEETING THIS OBJECTIVE, THE GROUP IDENTIFIES CHEMICALS CONSIDERED TO BE WEAPONS PRECURSORS AND RECOMMENDS THAT ALL PARTICIPANTS SIMILARLY CONTROL THE EXPORT OF THESE CHEMICALS. THE GROUP HAS NOT, AT THIS TIME, ADDRESSED BIOLOGICAL WEAPONS.

THE AUSTRALIA GROUP RECENTLY IDENTIFIED FOUR MORE CHEMICALS AS BEING PARTICULARLY USEFUL IN THE PRODUCTION OF CHEMICAL WEAPONS AND WE ARE EXAMINING THE INCLUSION OF THESE FOUR (AND OTHERS ON THE GROUPS WARNING LIST) UNDER OUR FOREIGN POLICY CONTROLS.

U.S. FOREIGN POLICY CONTROLS ON BIOLOGICAL AGENTS CURRENTLY APPLY TO SEVERAL CLASSES OF BIOLOGICAL MATERIALS BASED ON INACTIVITY INCLUDING ALL GENETICALLY ALTERED BIOLOGICAL MATERIAL. A VALIDATED LICENSE IS REQUIRED FOR THESE GOODS TO ALL DESTINATIONS EXCEPT CANADA. WE ARE WORKING WITH EXPERTS IN THIS FIELD THROUGH OUR INDUSTRY TECHNICAL ADVISORS TO ENSURE THAT THE APPROPRIATE AGENTS ARE IDENTIFIED AND CONTROLLED AND THAT INEFFECTIVE CONTROLS ARE ELIMINATED.

WHEN THE DEPARTMENT OF COMMERCE RECEIVES AN APPLICATION TO EXPORT CONTROLLED CHEMICAL AGENTS OR BIOLOGICAL MATERIAL TO A DESTINATION WHERE THERE IS NOT AN AUTOMATIC DENIAL POLICY, WE REFER THE CASE TO THE STATE DEPARTMENT AND TO THE INTELLIGENCE COMMUNITY. MEANWHILE, OUR ENFORCEMENT DIVISION CHECKS THE LISTED END-USER AGAINST OUR CLASSIFIED LIST OF UNRELIABLE OR QUESTIONABLE END-USERS AND EXAMINES ANY RELATED INFORMATION FROM INTELLIGENCE AND BUSINESS SOURCES.

ENFORCEMENT:

THE REAL "TEETH" OF OUR CONTROL SYSTEM IS IN OUR ENFORCEMENT PROGRAM. AS THE PRIMARY GOVERNMENT AGENCY RESPONSIBLE FOR ADMINISTRATION OF THE EAA, COMMERCE'S ENFORCEMENT ARM HAS A STRONG PREVENTION PROGRAM, AS WELL AS INVESTIGATION AND PROSECUTION ACTIVITIES. WE BELIEVE OUR FIRST RESPONSIBILITY IS TO PREVENT ILLEGAL SALES AND DIVERSIONS FROM OCCURRING. HENCE, THE ENFORCEMENT OFFICE'S ROLE IS TO REVIEW AND SUPPLY INFORMATION ON LICENSE APPLICATIONS. IT IS A VITAL ROLE. THEIR EXTENSIVE USE OF DATA GATHERED FROM THE INTELLIGENCE COMMUNITY AND BUSINESS SOURCES IS PARTICULARLY IMPORTANT BECAUSE EXPERIENCE HAS SHOWN THAT WE CANNOT RELY SOLELY ON RANDOM, VISUAL INSPECTION AT PORTS.

IN PARTICULAR, BIOLOGICAL MATERIAL COULD BE SLIPPED OUT OF THE COUNTRY BY SIMPLY PLACING A SMALL VIAL INTO ONE'S COAT POCKET AND GETTING ON AN INTERNATIONAL FLIGHT. IN ADDITION, BOTH CONTROLLED CHEMICALS AND BIOLOGICAL AGENTS OFTEN CANNOT BE IDENTIFIED BY VISUAL INSPECTION. THEY CAN REQUIRE TIME-CONSUMING LABORATORY ANALYSIS.

SINCE RANDOM PORT ENFORCEMENT EXERCISE FOR THESE ITEMS HAS LIMITATIONS, PUBLIC KNOWLEDGE OF U.S. EXPORT CONTROLS IS ESSENTIAL TO THE SUCCESS OF OUR EXPORT CONTROL PROGRAM. OUR OFFICE OF EXPORT ENFORCEMENT HAS AN ACTIVE OUTREACH PROGRAM IN THIS AREA TO EDUCATE THE CHEMICAL AND BIOLOGICAL INDUSTRIES ON EXACTLY WHAT CONTROLS ARE IN PLACE, AND ADVISING THEM ON HOW TO RECOGNIZE SUSPICIOUS ORDERS FOR THESE PRODUCTS.

WE HAVE RECEIVED VERY FAVORABLE RESPONSES FROM INDUSTRY ON THIS PROGRAM AND PLAN TO EXPAND OUR EFFORTS IN OUTREACH. COMMERCE EXPORT ENFORCEMENT ALSO CHECKS THE RELIABILITY OF THE END-USERS IN THE LICENSING STAGE AND MONITORS INPUT FROM THE INTELLIGENCE COMMUNITY THAT MIGHT INDICATE PROBLEM DESTINATIONS.

THE COMBINATION OF OUR LICENSING AND ENFORCEMENT PROGRAMS PROVIDES A COMPREHENSIVE APPROACH TO CONTROLLING THE INITIAL EXPORT OF CHEMICAL AGENTS AND BIOLOGICAL MATERIAL.

CONCLUSION:

MR. CHAIRMAN, MANUFACTURE OF CHEMICAL AND BIOLOGICAL PRODUCTS CONTINUE TO PROVIDE OUR NATION AND PEOPLE AROUND THE GLOBE WITH GOODS THAT ENHANCE ON QUALITY LIFE AND ECONOMIC PRODUCTIVELY.

HOWEVER, A SMALL NUMBER OF CHEMICALS AND BIOLOGICAL AGENTS CAN, GIVEN THE PROPER CIRCUMSTANCES AND COMBINATIONS, PRODUCE LETHAL EFFECTS. THE COMMERCE DEPARTMENT HAS THE RESPONSIBILITY OF CONTROLLING THE EXPORT OF SUCH PRODUCTS SO THEY ARE USED ONLY FOR PEACEFUL PURPOSES -- AND ADMINISTERING THESE CONTROLS IN A MANNER THAT MINIMIZES THE DISRUPTION OF LEGITIMATE COMMERCIAL TRANSACTIONS.

SINCE MANY BIOLOGICAL AGENTS, CHEMICALS, AND RELATED MANUFACTURING EQUIPMENT ARE COMMONLY AVAILABLE FROM SOURCES OUTSIDE THE U.S., OUR CONTROLS ARE ONLY EFFECTIVE IF WE RECEIVE THE COOPERATION OF OTHER NATIONS THAT SOURCE THESE PRODUCTS.

THIS CONCLUDES MY PREPARED REMARKS. I WOULD BE PLEASED TO ANSWER YOUR QUESTIONS.

CBW PROLIFERATION CONTROL

STATEMENT BY DEPUTY ASSISTANT SECRETARY ROGER HARRISON
U.S. DEPARTMENT OF STATE
BEFORE THE
SENATE COMMITTEE ON GOVERNMENTAL AFFAIRS
MAY 2, 1989

I am pleased to have the opportunity to appear before this committee today, to discuss with you the principal elements of our ongoing program to arrest the dangerous proliferation of chemical weapons (CW) materials and technology. I would like to present to you first the global overview of our nonproliferation efforts and then to answer your specific questions.

o The Global Context

Under the chairmanship of Australia, the "Australia Group" has been consulting informally since 1984 to improve the effectiveness of export controls on dual-use chemicals and to find ways to curb the illegal use of chemical weapons. The next meeting is scheduled for 9-11 May in Paris.

CW use in the Iran-Iraq War spawned formation of the Australia (Suppliers) Group in 1984. The U.S. supported Australian efforts to lead the Group of industrialized nations, whose goal is to discourage and delay CW proliferation by harmonizing national export controls on CW precursor chemicals and by exchanging information on CW proliferation.

The group meets informally twice a year in Paris. Group members are: EC-12, U.S., Australia, New Zealand, Japan, Canada, Norway and Switzerland. The Group has no charter or constitution and operates by consensus. Agreements are not binding under international law.

The Group has an informal "warning list" of 44 CW precursors. Most members develop and share the list with their chemical industry and ask chemical firms to report and turn down transactions which might be associated with the chemical weapons programs of Iran, Iraq, Libya and Syria. The US itself controls 40 of these 44 CW precursors and is in the process of bringing the other four under control. A subset of the "warning list" is a group of nine "core list" chemicals for which all Australian Group members have export controls.

The Australia Group has been a success. Its efforts have made it more difficult for would-be proliferators and others to obtain CW precursors. But it unfortunately remains true that countries intent on acquiring such chemicals can still do so.

As a further step, Secretary Baker has called for an international conference of governments and the chemical industry, which Australia has agreed to host, September 18-22, 1989 in Canberra. We hope that the Conference will create and develop a continuing dialogue between governments and industry. enabling the chemical industry to contribute to the success of the CW negotiations in Geneva and helping us to better control the burgeoning trade in CW precursors and technology.

The U.S. has publicly called on all governments to halt whatever assistance they, or their firms or citizens, might be providing to the Libyan CW program. Privately and confidentially we have also raised specific concerns with several governments concerning reported involvement by firms in their country in the Libyan CW program. Several governments have subsequently taken significant steps to help prevent further foreign assistance to that and other CW programs. The U.S. plans to remain vigilant and to continue diplomatic efforts to encourage others to take action which will help ensure that Libya does not succeed in achieving full-scale CW production.

Our success followed a series of consultations with the Japanese government concerning the involvement of Japanese firms at a metal fabrication plant adjacent to the Libyan CW plant at Rabta. The Government of Japan informed us that as of July 1988, Japanese firms had ceased all involvement with the metal fabrication plant. In addition, the Japanese government has taken a number of measures on its own initiative to strengthen export controls on precursor chemicals.

We are gratified by the legislation introduced in the Federal Republic of Germany as well, which would greatly tighten laws against the export of CW precursors and technology. That legislation would make it a crime for a citizen of the Federal Republic to participate in the construction of CW facilities like the one at Rabta. In addition, the European Community -- at West German initiative -- has taken up the CW issue on an urgent basis and is considering ways to coordinate export controls by all members.

We believe that the full range of our nonproliferation efforts, through participation in the Australian Group, diplomatic overtures to allies and others, and consultations with the chemical industry, have helped to impede the spread of CW capabilities. While we cannot claim to have stopped the traffic in CW materials and technology, we have succeeded in enlightening responsible government and industry leaders to the problem and in enlisting their cooperation, and have made it that much more difficult for states to acquire or expand CW capabilities.

I would now welcome your questions.

STATE DEPARTMENT ROLE IN LICENSING PROCESS

o The Licensing Process

Today, foreign policy export controls under Section 6 of the Export Administration Act of 1979, as amended, exist on 44 dual-use chemicals which may be used for civil purposes and can be used to make chemical weapons. Application for licenses to export these materials is made by the exporter to the Department of Commerce, which examines the license application and determines whether it requires review by the Department of State for foreign policy reasons. If so, the application is sent to the Bureau of Economic and Business Affairs, International Trade Controls Deputate for consultation with the concerned Bureaus and a determination to recommend to Commerce to issue or deny. The 44 chemical weapons precursors are generally denied for export to Iran, Iraq, and Syria. Additionally, 11 of those chemicals are controlled on a world-wide basis. The possibility of adding additional chemicals to this control regime is under active consideration.

On the other hand, licenses for the export of chemical weapons, technology and equipment, etc are issued by the Department of State, Bureau of Political/Military Affairs, Office of Munitions Control. These goods are defined in the International Traffic in Arms Regulations (ITAR - 22 Code of Federal Regulations, Chapter 1, Parts 121.1 and 121.7). Licenses are granted or denied following review by the Department of Defense in appropriate cases.

Dual use CBW related license applications have increased slightly over the past year. Part of the reason is increased awareness of the international concerns with chemical weapons proliferation and part is due to increased enforcement efforts by Commerce and Treasury (Customs).

Relations among State, Commerce, Defense, and Treasury in this area are very close. Cooperation is excellent. There are frequent inter-agency meetings to review general problems, consult on policy matters, and examine our participation in both multi-lateral and unilateral control efforts.

The chemical weapons precursor controls under Commerce jurisdiction are quite specific. They cover, at present, exactly 44 enumerated products, 11 world-wide and the remainder only to Iran, Iraq, Syria, and Libya (on which there is a total trade embargo in any case), as well as to COCOM proscribed destinations. State's Office of Munitions Control, on the other hand, regulates the export from the U.S. of six broad categories of chemical weapons, and cites 18 examples in a non-exclusive list. While there have been few disputes on jurisdiction in this area, such matters would be resolved through the commodity jurisdiction procedures of the ITAR if inter-agency agreement could not otherwise be achieved.

o Evaluation

The Department of State does not have primary jurisdiction over licensing dual-use (USDOC) cases. We provide the Department of Commerce our views on the suitability of the end-use and end-user, examine the suitability of the end-use/user and middlemen in the export transaction, and make a policy determination/recommendation. The same controls are exercised with respect to the export of technical information related to the manufacturer of these precursors. With respect to the control of the export of chemical weapons (State - OMC), we believe the Office of Munitions Control has an exceptional record. While present resources are adequate, a substantial modification of current laws and regulations could necessitate a request for additional manpower and funding.

o Improvements

We are working with the 19 member nations of the Australian Group and with our allies in COCOM to improve the world-wide export control regime on chemical weapons, chemical weapons precursors, and related equipment and technology. We expect to continue this effort and will seek to achieve uniform standards for the control of these materials. On a unilateral basis, we are discussing ways and means of improving our control system, expanding industry cooperation, and will be working with Congress on issues related to sanctions.

Testimony of Paul Freedenberg
Before a Joint Hearing of the Senate
Government Affairs Committee and
the Subcommittee on Permanent Investigations
on Controls on Dual Use Chemicals and Equipment
Which Could be Used in Chemical Warfare

May 2, 1989

The recent employment of chemical weapons by the Iraqis against Kurdish querillas and civilians and the use of such weapons during the Iran-Iraq War creates a sense of urgency about the issue before this joint hearing today. Reports that the Libyans are in the process of acquiring chemical weapons capability and that demand for such capability is spreading throughout the less developed world reinforces the seriousness of this problem. There is no room for complacency when weapons of mass murder seem to be proliferating and inhibitions against their use appear to be diminishing.

It serves little purpose, however, if the U.S. unilaterally brings its own civilian chemical industry under control while these products and the technology to produce them remains beyond effective multilateral controls. The problem is one which cries out for unified action on the part of the industrialized world. But experience tells us that the easy, or the emotionally appealing, solutions may not be the right ones for the problem at hand.

Let's look at the current control structure.

Our chemical and biological warfare controls are focused both on the commodity involved in the export and the end-user. As the Government witnesses have explained, the commodities have a number of legitimate commercial uses such as fertilizers, inks, and pharmaceuticals, and are difficult, if not impossible, to distinguish from commodities used for weapons development. The logical conclusion, then, is that we need to focus on the end-user. This means heavy dependence on intelligence sources, both domestic and foreign.

However, knowledge and expertise on the technical capabilities of the commodities and the identity of the end-user are applicable only when an individual validated license is required. But since most of the production equipment and technical data that could be used in chemical weapons development is available from a vast array of foreign sources in both the West and the East, it can be shipped from the U.S. under a general license with no Government review required. Specifically, chemicals and chemical manufacturing equipment are not controlled to the so-called Australia Group countries and the majority of the technological data is not controlled to most of the world.

As I see it, we have three choices:

1. We could change our controls to require individual review for all goods that could potentially be used in weapons development. But this is not a viable option, given the volume of international business done by the chemical industry and the enormous foreign availability. The U.S. chemical industry had $268 billion sales in 1988, with 10's of billions in export sales and a positive trade balance of $12 billion.

2. We could communicate to U.S. exporters the names of end-users that we suspect of chemical weapons development. While this approach makes sense, the U.S. Government has run into a number of legal and political difficulties in trying to do the same thing for sensitive nuclear end-users.

3. We could target our controls on "choke point" (or the most sensitive) goods and at the same time press for multilateral cooperation in controlling international trade in these goods. To me, this seems to be the most sensible and achievable option available to us.

The Australia Group, which you have also heard the Government witnesses discuss, has determined that 40 chemicals are sensitive in the development of chemical weapons. The Group recommends that all participants control 9 chemicals on a "core list"-- I believe the level is now up to 17 on the core list of most sensitive chemicals, with the rest of the 40 on the list being a "watch list." Because of the seriousness with which we monitor these chemicals, the U.S. currently maintains stricter controls on the chemicals identified by the Australia Group as chemical warfare precursors than any other participant in the Group. Of course, we also have the most stringent licensing system. Thus, we are already doing the best job of controlling these chemicals at the national level.

Many have suggested that the Australia Group be strengthened to more closely resemble the principal Western organization for controlling militarily sensitive goods and technologies, Cocom. While I agree that the Australia Group is important, and should be strengthened, it is important to remember that the basic organizing premise for Cocom controls does not exist for chemicals.

Cocom is based on the fact that we, and our allies, have a technological advantage over our potential military adversaries in the Warsaw Pact. We maintain export controls at the national level to maintain that advantage. Cocom can identify goods with potential military uses, and the organization has clearly defined parameters for "good" and "bad" end-users.

In the area of nuclear controls, the signatories to the Nuclear Non-Proliferation Treaty are public knowledge and, again, the goods and technology involved can be readily identified. Nuclear technology is not available world-wide and is very sophisticated.

On the other hand, chemicals and chemical weapons production equipment and technology are quite different. The various countries involved in their production have different concepts of who are unreliable or "bad" end-users. Moreover, since some of these countries are neutral, or non-aligned, there is no clearly defined target group for denial of this capability. Even some of our allies would disagree about the exact composition of the "bad guy" list. Most importantly, the chemicals, equipment, and technology are available world-wide and do not represent particularly sophisticated capabilities.

We, therefore, can neither expect nor insist that the prevention of chemical and biological weapons development be handled solely through export controls. Such controls are simply not a viable mechanism, because there is neither international agreement on their need or their scope.

Moreover, it is highly likely that developing countries, with the capability to produce chemical weapons will resent another "big boys' club" approach (resembling Cocom), particularly in the absence of some sort of commitment on the part of the major powers to the elimination, or, at least, reduction of stockpiles, or other weapons reduction measures.

It has been announced that the Australian Government is planning a government-industry conference for September of this year to discuss the problem on a world-wide level. The idea for this conference came from the U.S. Government, and I believe that it is the best hope we have for beginning to effectively control the means to produce chemical weapons.

The most important goals of this type of multilateral conference would be better enforcement coordination, better intelligence coordination, and heightened industry and public awareness of this problem. Planning, coordination, and hopefully a commitment to national legislation from those attending this conference are critical. Without international public and industry support for the prevention of chemical and biological weapons proliferation, and without a plan for accomplishing this objective that takes into account legitimate commercial considerations, the U.S. alone will never accomplish the objective of stemming the rising tide of chemical warfare capability in the less developed world.

Within our own borders, the outreach program being implemented by the Customs Service and Commerce Department's Office of Export Enforcement to inform U.S. industry of the goals of Chemical and Biological Export controls and the importance of industry input in accomplishing these goals is indispensable. Hopefully, the September conference will lead to this type of education program for foreign producers sponsored by foreign governments.

A final point needs to be emphasized. Based on my three and one-half years of experience as the principal export control official of the U.S. Government (two years as Assistant Secretary of Commerce for Trade Administration and one and one-half years as Under Secretary for Export Administration), I am convinced that multilateral cooperation would be seriously undercut by unilateral, or extraterritorial, U.S. sanctions. Such sanctions, which would be mandated by legislation already introduced in the U.S. Senate, would be particularly unfortunate, because the need for worldwide attention to this issue is too important to allow it to be damaged by unilateral "punishment" by the U.S. Government for sales that were completely legal under the laws of the home country. Experience tells us that it is up to the various national authorities to punish their own wrong-doers in this area. They are the only ones equipped to do the job on an on-going basis. The U.S. Government is certainly not equipped to be the policeman of the world in this area.

Clearly the prohibitions on export of chemical weapons capability need to be significantly strengthened. But we will never get the necessary legislation and enforcement from other industrialized countries if we act unilaterally and extraterritorially. What we would most likely get from them with such action would be blocking legislation and lethargic enforcement.

In conclusion, while there is ample reason for caution in legislating in this area, there is no reason for despair. On the positive side, there does seem to be a growing international consensus among the industrialized countries that action is necessary. I believe that if we put enough diplomatic muscle behind the Australia Group conference this September, we might very well see the necessary international cooperation and coordination that I have outlined in place by the end of this year. But in order to accomplish this critical objective we must avoid precipitous action that undermines the very basis incentive for such cooperation.

New York Times, 26 March 1989

POISON GAS FEARS LEAD U.S. TO PLAN NEW EXPORT CURBS

SHORTCOMINGS ARE CITED

Controls Said to Have Same Faults That Let Europeans Help Libya and Iraq

By MICHAEL R. GORDON
with STEPHEN ENGELBERG
Special to The New York Times

WASHINGTON, March 25 — Bush Administration officials acknowledge that United States export controls have many of the same deficiencies that have permitted Western European companies to help third world countries build poison gas factories without fear of legal sanctions.

The Bush Administration is studying ways to correct the shortcomings, which some Administration officials fear could undermine efforts by American officials to persuade allied nations to help stem the proliferation of chemical weapons with stronger export rules.

This year, after repeated American complaints about the role of West German companies in the chemical weapons programs of Libya and Iraq, the Bonn Government proposed tighter export laws. Swiss officials said this month that they were considering similar changes, after American complaints that a Swiss company provided Egypt with the main elements of a factory that could be used to make poison gas.

Some Exports Not Barred

But American officials say the existing United States export regulations do not bar the export of chemicals and equipment that can be used for poison gas manufacture to many third world nations, including some that the United States has identified as having active chemical weapons programs.

As an example, officials cited a 1985 deal in which an American company, Stauffer Chemicals, provided the design for a plant in Egypt that makes a chemical that can be used to make both nerve gas and nonlethal civilian products.

"If you want to stop this stuff from getting to everyone beyond the industrialized West who has poison gas capability, the law needs to be strengthened," Paul Freedenberg, Under Secretary of Commerce for Export Administration, said in an interview.

Administration Reviewing Laws

Mr. Freedenberg said the Bush Administration had started a review of its export regulations and was already planning to take some corrective steps, such as expanding the list of chemicals that are barred for sale outside the West without a license. He said the existing rules were sufficient to prevent the export of chemicals needed for poison gas to Iran, Iraq, Syria and Libya.

While no foreign country or American legislator has assailed the United States export regulations on chemicals, a State Department official said, "There is a realization that we have got to get our own house in order, particularly when we are beating on other peo-

U.S. Seeks to Cut Poison Gas Spreac

Continued From Page 1

ple for tolerating chemical deals that we don't like."

"I live in fear of the day when the German Ambassador may come in here and say that Bonn has found an American company selling chemical weapons materials to the Middle East," he added.

William H. Webster, the Director of Central Intelligence, told Congress last month that American export laws were "probably not" strong enough.

American export controls have several major weaknesses, according to Administration officials and experts outside of Government. These were among the weaknesses cited:

¶Export controls do not restrict the sale of some key chemicals used to make posion gas to some third world nations that have or are suspected to be manufacturing chemical weapons. This limitation exists even though these chemicals are identified as substances to be controlled in international export guidelines endorsed by Washington.

¶There are no controls on the export of much of the equipment, technology and expertise needed to make chemicals for poison gas.

¶The law does not allow the United States to pursue Americans who broker deals overseas for foreign materials for third world poison gas plants, Commerce Department officials say. West German officials say Bonn's proposed laws would make it a crime for a German citizen to take part in such activity.

Over 20 Nations Identified

An American official last month for the first time identified many of the more than 20 nations that the Administration says have obtained poison gas or are developing the ability to make it. Nearly all of these countries could reasonably be expected to be in the market for "precursors" or equipment.

Precursor chemicals are those that can be transformed into poison gas. These substances are "dual use," meaning they can be used for chemical weapons or for commercial purposes.

In little-noticed Congressional testimony, Adm. Thomas E. Brooks, director of Naval Intelligence, said the nations included Iraq, Iran, Syria, Libya, Egypt, Israel, India, Pakistan, Burma, North Korea, Taiwan, China and Ethiopia. Another Administration specialist confirmed that most of those nations were on the list but added that there was no firm proof in the case of India and Pakistan.

A group of about 20 industrialized nations led by Australia has agreed on a list of 40 precursor chemicals whose export is to be monitored. Of these, 9 are considered so closely linked to poison gas that they are on a "core list," meaning that their sale to third world or East-bloc nations is to be carefully controlled.

Paul Freedenberg, an Undersecretary of Commerce. "If you want to stop this stuff from getting to everyone beyond the industrialized West who has poison gas capability, the law needs to be strengthened," he said.

> The aim is to eliminate shortcomings in export laws.

But the American export controls do not restrict the sale of some of these "core list" chemicals to all nations in the third world developing chemical weapons or now possessing them. The list includes phosphorous trichloride, trimethyl phosphite and thionyl chloride. American export laws allow the sale of these chemicals, without export license, to such nations as Egypt, Israel, India, Pakistan, Burma, Taiwan, and Ethiopia.

Strict Controls on 3 Nations

In contrast to the weak controls that the United States has on the export of chemicals to those nations, it has stringent export controls in the case of case of Iran, Iraq and Syria. Libya is the subject of an overall trade embargo. There are also various controls on the sale of dual-use chemicals to Communist nations and to South Africa.

Administration officials say the United States has had more strict controls on Iraq, Iran, Syria and Libya because these nations have ties to terrorists groups. Also, Iraq, Iran and Libya have used chemical weapons in recent years.

But a senior Bush Administration official said the President's strong statements during the election campaign on slowing the proliferation of chemica weapons were meant to apply to the entire world.

Commerce Department officials sai the Administration is planning t broaden the scope of the controls on the chemicals on the "core list" so tha they apply to all third world and East bloc nations.

Another area under review by the Administration is whether to establis controls on the equipment and technology needed to make poison gas Commerce Department officials said.

Licenses Often Not Required

The United States does not requir export licenses for much of the equipment and technology needed to mak these chemicals.

Some Administration officials sai the need for stronger American controls was illustrated by the role that ar American company played in indirectly helping Egypt improve its ability to make poison gas.

In 1985, Stauffer Chemicals sold the design for a chemical plant to make phosphorous trichloride to Krebs A.G. a Swiss company. The contract specified that the plant, modeled after a Stauffer plant in Pennsylvania, woul be built by Krebs for El Nasr Pharmaceutical Company of Egypt.

Phosphorous trichloride can be use to make pesticides, among other civilian purposes. It is also a key ingredien in the production of Sarin, a deadl nerve gas and is on the Western cor list of precursor chemicals.

The phosphorus trichloride plant ha been completed and is now operationa American officials fear the chemica could be used to supply a second plan the elements of which have been delivered to Egypt by Krebs.

This month, under pressure from th Swiss Foreign Ministry, Krebs severe its relations with this second projec And the State Department raised it concerns with the Egyptian Ambassador here.

Stauffer's chemical business ha since been acquired by several majo concerns, including ICI Americas, the American arm of a British chemica company. A spokesman for ICI, Sheldon Jones, said his company would no comment on the matter because the sale was completed before ICI acquired Stauffer's agricultural chemical business.

Commerce Department officials sa establishing controls on the export o equipment and technology that has legitimate civilian uses is inherently difficult. Moreover, they say, that suc controls must be matched by othe countries to be effective.

"There may be things we can revie to see if we can tighten up our own law further," said Mr. Freedenberg. "W want to take action that is prophylacti and not wait for an embarrassment. I can't say that there is in place at thi very moment a comprehensive structure that will prevent the export o dual-use equipment or of precursors al over the world. It does not exist."

tronics Association — a CODSIA member organization — wrote to Hall Jan. 5, emphasizing that industry wants to cooperate, but not at the expense of ignoring the impact on small business. Iverson the AEA wanted to ensure the rule, as it is refined into a final regulation, is drafted in a way that makes it suitable to the size of the companies involved.

A public comment period on the mandatory code of conduct rule closed Jan. 30, but the Defense Acquisition Regulatory Council has not yet moved to turn the proposed rule into a final rule.

The notice of the paperflow involved was required to be published in the *Federal Register* under the Paperwork Reduction Act, and is also subject to rejection or alteration by Evyette Flynn, OMB's regulatory desk officer for the Pentagon.

ban on nuclear-powered satellites.

Today, only the Soviet Union is actively using nuclear power in satellites, specifically for their low-Earth-orbit radar ocean reconnaissance satellites (RORSAT). RORSAT is a potential target for a future U.S. antisatellite weapon system because it is RORSAT that keeps track of naval deployments.

Brown said that aside from the environmental and safety reasons for banning nuclear power in space, there are national security concerns. By abandoning RORSAT, the Soviet Union could de-escalate the antisatellite weapons race.

"U.S. national security would suffer in the event of a U.S.-Soviet antisatellite weapons arms race," Brown said.

He explained that neither side now has the capability to disable the other's military satellites but that it is the United States, which is more dependent on such satellites, that would have the most to lose from developments of antisatellite weapons.

"From what I have seen, the vast majority of proposed missions for nuclear power in Earth orbit are military ones and provocative ones at that," Brown said.

He did say that nuclear-powered satellites are necessary for deep-space probes because the power of the sun at those distances is too weak to generate a photo-voltaic current.

DEFENSE NEWS FILE PHOTO

Rep. George Brown,

who has led the fight against nuclear-powered satellites, said that of the 60 satellites launched, 15 percent have encountered some failure or accident.

2-27-89 DEFENSE NEWS

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iles Launch of
nce Warhead

A HITCHENS

t month plans to launch Rocket System/Terminal T), the second stage of the inter-

designed to give the short-range fire-and-forget capability against Under the program, the basic anced, guided submunitions.

nture company developing the ful field tests of components late th about $200 million. The joint nsists of Martin Marietta Corp., he Federal Republic of Germany; Thorn EMI Ltd. of the United ando, Fla.

r is seen as the program's breakpment demonstrations showed ets through "moderate" ground aid. Each of the three submunitndy will be able to locate a target extremely small antennas.

en, chairman of MDTT, "is the t armored targets vs. trees and component demonstration also k a moving target on the ground. is also "something of a break-

is also a possible candidate for Missile System (ATACMS). The t up to work with ATACMS, Ga-

request for proposals ATACMS. The resulting of principle" phase, known as request for proposals addresses e Army, industry sources said, ether is best for ATACMS.

Workers Lack Expertise to Control Chemical Exports

Report Says Personnel May Not Recognize Ingredients Used in Weapons Production

By DAVID SILVERBERG
Defense News Staff Writer

WASHINGTON — U.S. enforcement personnel lack the technical expertise to enforce export controls on the ingredients used in chemical weapons, according to a Commerce Department report to Congress.

The problems are detailed in the "1989 Annual Foreign Policy Report to the Congress" by the Commerce Department's Bureau of Export Administration.

The report examines the impact of U.S. export controls initiated for such foreign policy reasons as fighting terrorism, punishing human rights abuses or preventing the spread of chemical weapons. It was signed by C. William Verity, former secretary of commerce, and sent to President Bush and House Speaker James Wright, D-Texas, Jan. 19. It was released by the Commerce Department this month.

For the most part, the report found that existing controls on exports to Syria, Libya, South Yemen, North Korea, Vietnam, Cambodia, Cuba, the Soviet Union and South Africa achieved their purpose without extensive adverse impact on U.S. businesses.

However, for chemical weapons, the report noted that the lack of technical expertise by enforcement officials made it difficult for them to recognize the relevant chemicals. Additionally, some of the chemicals have civilian uses, making it difficult for enforcement officials to identify contraband shipments.

This lack of expertise also extends to physical inspection of the chemicals, according to the report. Enforcement personnel are unaware of the necessary precautions when handling them, it says.

The specialized nature of chemical warfare-related export controls "would require a substantial reallocation of resources if the department were to direct specialized enforcement concerning exports of chemicals," the report says.

While the United States attempts to deal with the problem of enforcing chemical-related export controls, the Federal Republic of Germany announced Feb. 14 that it was tightening its export control regulations to prevent sales of chemicals and technology related to chemical warfare.

The new regulations resulted from the admission by West German government authorities that West German firms had participated in construction of a Libyan chemical warfare plant. According to reports that have emerged from the investigation, West German companies provided a wide range of materials from steel tubing to the ingredients for the poison gases.

Under the new regulations, companies dealing with substances or equipment related to nuclear, chemical, or biological warfare or with delivery systems. will have to register with the government.

However, for chemical weapons, the report noted that the lack of technical expertise by enforcement officials made it difficult for them to recognize the relevant chemicals.

When applications are made for export licenses in these areas, the application will be circulated to the West German Customs Crime Institute, the body dealing with trade crimes, and to the government offices of trade and industry. This way, West German enforcement authorities will have greater knowledge of what is being shipped in this area.

The government will have to approve the export of particularly hazardous materials, and West Germany will be prohibited from participating in the production of chemical or biological weapons abroad. Punishment for violations will be increased from three years in prison to five and fines will go up from a maximum of 500,000 West German marks (about $277,000) to a maximum of 1 million marks (about $555,000).

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Webster Says Laws on Chemical Arms Exports May Be Too Weak

WILLIAM H. WEBSTER
... did not name firms involved

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By R. Jeffrey Smith
Washington Post Staff Writer

Central Intelligence Agency Director William H. Webster said yesterday that U.S. laws are "probably not" adequate to block deliberate export of equipment and chemicals needed to manufacture gases for chemical warfare, although no evidence of such shipments by U.S. firms has been uncovered.

Webster's statement came amid growing congressional support for legislation to tighten controls on poison gas components and impose sanctions on firms and individuals violating them, here or overseas.

Several legislators said their interest in the bills was fanned by Webster's testimony yesterday morning to the Senate Governmental Affairs subcommittee on investigations. He said West European and Asian firms have played key roles in development of poison gas plants and munitions in Syria, Iran, Iraq and Libya.

"Assistance by foreign suppliers, many of whom were fully witting of the intentions of the Middle East countries to produce chemical weapons, has been the key element" enabling the countries to begin production quickly over the past decade, Webster said.

His testimony contained new details about Middle East poison gas programs, but he did not name firms or identify locations of suppliers the intelligence agency has linked to the programs.

These details were instead provided by State Department and CIA staff to a closed afternoon hearing of the Select Committee on Intelligence.

Webster testified that foreign suppliers had provided technical and operations advice, construction assistance, vital chemical "precursors," production equipment, munitions parts and training.

Webster said his agency had received information "from time to time" that materials used in Middle East chemical warfare programs had originated in the United States. But he was unable "at this time . . . to say that any U.S. firms were witting participants or aiders and abetters" of the programs.

He declined to state the CIA position on the proposed legislation, but acknowledged to a question that containing the spread of chemical weapons would have much easier if such legislation had been enacted several years ago.

Senate Minority Leader Robert J. Dole (R-Kan.), a principal sponsor of the sanctions measure, said Webster's statement made it "clear there is a need for strong, effective U.S. action. . . . We need tough legislation to shut out of the American market those firms that treat [Libyan leader Moammar Gadhafi] and his ilk as prised customers."

Dole's bill calls for shutting off import rights and U.S. government contracts to foreign firms that "aid or abet" a chemical weapons program in the Soviet bloc or the Middle East. A bill introduced by Sen. Jesse Helms (R-N.C.) would suspend patent rights of anyone in trade linked to poison gas.

A third bill introduced by Sen. Claiborne Pell (D-R.I.) would embargo trade and stop loans to countries that used chemical weapons.

Webster indicated the CIA was uneasy about provisions requiring a public report on who had aided the chemical warfare programs. "Much of the information that is currently being developed is quite sensitive and could be readily attributed to a limited number of discreet sources," he said.

But an intelligence committee source who asked not to be identified said "there really is no overriding reason" for the secrecy.

Source: Nature, 23 February 1989.

Export restrictions on chemicals with 'weapons' applications

Compound	United Kingdom	United States	West Germany	East Germany	France
1. Thiodiglycol	■	■	■	■	■
2. Phosphorous oxychloride	■	■	■	■	■
3. Dimethyl methyl phosphonate	■	■	■	■	■
4. Methyl phosphonyl difluoride	■	■	■	■	■
5. Methyl phosphonyl dichloride	■	■	■	■	■
6. Dimethyl phosphite	■	⬓	■	—	□
7. Phosphorous trichloride	■	⬓	■	■	■
8. Trimethyl phosphite	■	⬓	■	—	□
9. Thionyl chloride	—	⬓	□	—	—
10. 3-Hydroxy-1-methylpiperidine	—	⬓	□	—	—
11. *N,N*-diisopropyl-*β*-aminoethyl chloride	—	⬓	□	—	—
12. *N,N*-diisopropyl-*β*-aminoethane thiol	—	⬓	□	—	—
13. 3-Quinuclidinol	—	⬓	□	—	—
14. Potassium fluoride	⬓	⬓	□	—	—
15. 2-Chloroethanol	⬓	⬓	□	■	—
16. Dimethylamine	⬓	⬓	□	■	—
17. Dimethylamine hydrochloride	—	⬓	□	—	—

■: Export licences required. ⬓: Licence required for export to certain countries. □: Export licences to be required in near future. —: No licence required. Data are courtesy of the Geneva Disarmament Conference. The first five compounds on the list include precursors of mustard gas and the nerve gases tabun and sarin. The list includes fluoridating agents (14) and solvents (15) with a number of industrial and pharmaceutical uses as well as phospho-organic (6–8) that may serve as nerve gas precursors. (Data supplied by Verband der Chemischen Industrie).

PUBLIC REPORTS OF POSSIBLE U.S. CBW-RELATED EXPORTS

DATE	COMMODITY	DESTINATION	SUPPLIER	REFERENCE
1987-1988	90 TONS THIODIGLYCOL	IRAN	ALCOLAC	COURT DOC'S
1987-1988	OVER 500 TONS THIODIGLYCOL (IN 4 SHIPMENTS)	IRAQ	NU-KRAFT MERCANTILE	COURT DOC'S
1987	HT-2 AND T-2 MYCOTOXIN SAMPLES	IRAQ	SIGMA (FRG SUBSID.)	DER SPIEGEL
1986-1989	HUNDREDS OF SARIN NERVE GAS BOMBS (ORDER)	MIDDLE EAST	COMEX INTERNATNL	COURT DOC'S
1985	PLANT DESIGN FOR MAKING POTASSIUM TRICHLORIDE	EGYPT	STAUFFER CHEM. (VIA SWISS CO.)	N.Y. TIMES
1984	1,100 POUNDS POTASSIUM FLUORIDE (SEIZED IN NY)	IRAQ	AL HADDAD TRAD. CO.	CHR.SCIENCE MONITOR
1983	500 TONS THIODIGLYCOL	IRAQ	PHILLIPS (BELG.)	CHR.SCIENCE MONITOR
MID 1980'S	INDUSTRIAL COOLING EQT	LIBYA/RABTA	ALFRED TEVES (ITT)	WALL STREET JOURNAL
MID 1980'S	COMPUTER	LIBYA/RABTA	HARRIS	STERN (FRG)
?	TULAREMIA BACTERIA	IRAQ	ATCC ?	SEN. McCAIN

Source: Senate Committee on Governmental Affairs.

Before the Senate Committee on Government Affairs
and the Permanent Subcommmittee on Investigations

Hearings on Export Controls Over Equipment, Materials and Technology Associated with Chemical and Biological Weapons

Statement of
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Peter D. Trooboff
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May 2, 1989

The Chemical Manufacturers Association (CMA) appreciates this opportunity to appear before these joint Committee hearings concerning United States export controls over equipment, materials, and technology associated with chemical and biological weapons. My name is Max Turnipseed. Currently I am CMA's Special Trade Advisor, working on the Uruguay Round of the MTN, EC 1992, and export control matters, while on loan to CMA from Ethyl Corporation. At Ethyl, and as a member of the Industry Sector Advisory Committee for chemical and allied products (ISAC-3), I have worked in the international trade area for over 15 years. In the trade area, I have had significant responsibility for coordinating and implementing Ethyl's export compliance program. I am addressing your questions based on my first-hand experience with Ethyl as well as from the perspective of CMA's export control policies for chemicals that are potential chemical weapons precursors.

With me today is CMA's counsel for this matter, Peter D. Trooboff of Covington & Burling, who has 20 years experience in the export control field. Mr. Trooboff has been working with CMA on the chemicals weapons control issue and is available to help answer the Committee's questions on export controls.

CMA is a non-profit trade association whose member companies represent 90 percent of the production capacity for basic industrial chemicals in the United States. CMA's members are actively involved in the export and import of a wide range of industrial chemicals. They have significant investment in manufacturing facilities and sales operations in many developed and developing countries throughout the world. Today, we will concentrate on the chemical weapons aspect of your hearings and the questions relating to chemicals that you have raised in your invitation to testify.

To summarize CMA's testimony, the Association and its members strongly support a multilateral treaty to ban chemical weapons. As manufacturers, processors and distributors of chemicals, the members of CMA share a common concern about the potential diversion of chemicals from legitimate uses to the production of chemical weapons or substances capable of abuse. At the same time, CMA members wish to caution against regulatory programs that impose excessive, ineffective burdens on legitimate commercial activities.

In particular, CMA urges that the United States avoid unilateral export control programs that place American companies at a disadvantage in competing for legitimate commercial sales with European, Japanese and other manufacturers for legitimate commercial sales who do not face similar burdens. Effective and fair export controls will result only from a multilateral regime negotiated with our major trading partners. Unilateral programs will cause adverse economic impact on the domestic industry and will undermine the capacity of our industry to contribute toward a more favorable United States trade balance. CMA and its members have voluntarily initiated a number of steps to encourage greater understanding of current U.S. export control programs and we are planning a number of additional steps in the near future.

I. CMA Commitment to Chemical Weapons Ban

It is critical to understand the role of chemicals in this nation's overall trade picture. In 1988 our industry accounted for over a $12 billion trade surplus, thereby making a significant contribution to the overall international competitiveness of the United States. Shipments of chemicals and allied products in 1988 amounted to $239.7 billion, of which 13.5 percent were exports. To CMA's knowledge virtually all those exports were conducted strictly in accordance with U.S. laws and regulations.

CMA has strongly supported the negotiation of a treaty banning the production and possession of chemical weapons. Our policy on this subject was expressed most recently in principles adopted by the CMA Board of Directors in October 1987.

CMA has worked for over ten years with the United States Government on such a treaty and related issues. Our cooperative effort and the Association's internal policies are coordinated through its Chemical Weapons Work Group, which is chaired by Dr. Will Carpenter of Monsanto Agriculture Company. This Working Group has met regularly with United States Government officials from all of the agencies involved in the effort to negotiate a chemical weapons ban including the Arms

Control and Disarmament Agency, the Departments of Defense, State and Energy, the Joint Chiefs of Staff, and the intelligence community.

CMA has also cooperated in this activity with the trade associations that represent chemical manufacturers in other nations. These include: the European Federation of Chemical Manufacturing Associations (CEFIC), representing 17 national trade associations; the Japanese Chemical Industry Association (JCIA); the Canadian Chemical Producers Association (CCPA); and the Australian Chemical Industry Council (ACIC).

While we recognize that these hearings focus on export controls, CMA would note that there are important issues regarding the proposed treaty that relate to the subject which is now before you. For example, our members are concerned about the protection of proprietary information under the proposed treaty regime. Our experts have also expressed views about the effectiveness, intrusiveness and high cost of any routine inspection system for facilities that manufacture and use precursors to chemical weapons agents. In addition, our members have opposed extending the proposed reporting and inspection requirements under a chemical weapons treaty to plants "capable" of producing "super-toxic" chemicals. This extension would vastly increase the universe of facilities subject to the treaty and would greatly raise the verification cost with little or no gain in achieving the treaty's objectives. These cautions about potential over-regulation arise equally in considering the appropriate level of export controls for chemicals and related technical data and production equipment.

II. United States Government Enhancement of Controls on Products Capable of Use in Manufacturing Chemical Weapons

A. State Department Controls on Chemical Agents

For many years, the State Department's Office of Munitions Control has imposed export controls on those chemicals agents which are included on the Munitions List of the International Traffic in Arms Regulations. These controls apply to a lengthy list of lung irritants, vesicants, lachrymators and tear gas, sternutators and irritant smokes, nerve agents and herbicidal chemicals. The State Department regime also covers technical data (including services and training) directly related to the development, fabrication, and use of such chemical agents.

As far as CMA is aware, there are no problems regarding the comprehensiveness of these State Department controls or their effectiveness. Nor, to our knowledge, have the controls on chemical weapons agents imposed any difficult interpretative issues for United States industry. The intelligence community would be most familiar with whether there have been efforts by unauthorized persons to obtain such agents from U.S. industrial sources. Given the existing system for handling such agents, we doubt that there are many serious problems of potential diversion to proscribed destinations.

B. Commerce Department

Over the past several years, the Commerce Department's Office of Export Licensing has under the Export Administration Regulations enhanced the scope of United States controls on products capable of use in manufacturing chemical weapons. In 1984, the Department placed licensing requirements on the export of eight chemicals to Iran and Iraq (five in March 1984 and three in September 1984). These controls were broadened to include Syria in June 1986. Eight additional chemicals were added to this list in July 1987. The controls are reported to have resulted from evidence that these countries were seeking to obtain these chemicals for weapons manufacture relating to the Iran-Iraq war. License applications are not generally granted for the export of any of these products to any of these countries. Since 1982 Libya has also been subject to controls on receipt of these and other U.S.-origin products.

The Commerce Department also decided in July 1987 to require licensing prior to exporting five chemicals to any destination other than NATO countries, Switzerland, Australia and New Zealand. By this action, the Department harmonized United States controls with those of the 18 other NATO and Western countries that maintain comparable licensing regimes on export of these products from their countries.

Finally, in February 1989, the Commerce Department, acting under the Export Administration Act, altered the basis for these controls for 23 chemical products from national security to foreign policy. Controls on a few chemicals were also removed. This action was necessary because the national security basis for control was expiring under provisions in the Omnibus Trade and Competitiveness Act of 1988. The only additions to controls that occurred in February 1989 related to the export of certain chemicals to Iran, Iraq, Syria and Libya. Again, the purpose was to limit the chemical weapons manufacturing capacity in the proscribed destinations.

In announcing its recent amendments to the Export Administration Regulations, the Commerce Department explained that the United States sought to "harmonize our controls with those of other Western countries that are concerned about the proliferation of these chemicals and publicly convey the United States opposition to the use of chemical weapons." (54 Fed. Reg. 8282 (Feb. 28, 1989)). The Department went on to request public comment on the new controls and said that it was "particularly interested in comments on the possibility of further controls on additional chemicals and on technical data and production equipment related to these products." In a moment, I will discuss CMA's views on the issue of such further controls.

C. Drug Enforcement Administration

The Chemical Diversion and Trafficking Act of 1988 establishes customer identification, recordkeeping, reporting and notification requirements relating to the distribution, import and export of certain precursor and essential chemicals and tableting and encapsulating machines utilized in the manufacture of controlled substances. In January and early February 1989, the Drug Enforcement Administration proposed regulations to implement these requirements. While these controls are not directly related to chemical weapons, it is important to be aware of the proposed requirements since CMA members must comply with these multiple regulatory regimes.

CMA fully supports the new legislation and its underlying purpose of eliminating illicit drug use by preventing illegitimate production and distribution. On March 27, CMA submitted comprehensive comments to DEA concerning the regulations proposed under the Act. Unfortunately, DEA has included provisions in the proposed regulations which are not authorized by the statute and which would not in our view contribute to the statute's objective. The proposed regulations would have the effect of unnecessarily compounding the burdens of the recordkeeping and reporting system established by Congress, with no incremental benefit in controlling illicit drugs. If promulgated as proposed, this U.S. drug enforcement program would put our industry at a potential disadvantage in meeting the competition of foreign manufacturers that face no similar requirements.

III. Controlling Products Usable in Chemicals Weapons Manufacture -- The Need for Multilateral Action

CMA believes that the previously summarized programs for controlling chemical weapons and precursors constitute a comprehensive and reasonably well-designed U.S. regime which, assuming compliance, should help prevent the spread of chemicals weapons manufacturing capabilities. Some fine tuning in the U.S. control system may be needed after we have a little time to work with the existing level of controls and determine whether there are problems. Our members are convinced that any more extensive U.S. regime would contribute to the prevention of chemical weapons proliferation only if all countries with militarily significant chemical weapons manufacturing capabilities participate in any new restrictions.

Recent experience with the Soviet pipeline and with other U.S. sanctions programs has amply demonstrated that United States unilateral export controls do not achieve their intended results. Instead, unilateral action causes U.S. industry to lose markets while foreign competitors take advantage of the market opportunities.

Unilateral action is particularly inappropriate when -- as is the case for chemicals -- many of the products and the related technology have well-established, legitimate uses in non-sensitive commercial markets. Experience with export controls on other products shows that trade restrictions on such dual-use materials are effective only if there is a well-defined agreement on what policies the governments of all potential suppliers will follow in carrying out export limitations. Such an agreement would identify the criteria for determining which export end-uses are permissible and should minimize competitive harm to any supplier.

The House Committee on Science, Space, and Technology has recently issued a Staff Report on "Export Controls, Competitiveness and International Cooperation: A Critical Review" summarizing the results of that Committee's hearings in 1987 concerning the National Academy of Sciences' report on "The Impact of National Security Controls on International Technology Transfer." In its opening paragraph of recommendations, drawn from the NSA study and the hearings, the Staff Report states:

> ". . . disparities between the U.S. and other nations in the enforcement, compliance, and interpretation of export controls have placed U.S. industries at a competitive disadvantage with respect to foreign producers. As a result, the central issue is the pursuit of ways for enhancing international cooperation for a strengthened multinational export control system.
>
> "The need to remove these disparities, combined with the recognition of the global economy within which U.S. industries compete, requires a strong and uniformly-administered multinational export control system. Hence, the U.S. must place priority on developing and supporting an effective multilateral control system." (Committee Print, 100th Cong., 1st Sess. Serial A at 1 (Feb. 1989.)

Bills pending in the Congress would attempt to sanction other governments that permit their foreign business enterprises to export precursor chemicals to nations believed to be engaged in chemicals weapons manufacture. These bills would impose sanctions on the foreign business enterprises as well. CMA's concern is that such efforts at sanctions will prove ineffective, create serious political frictions with our Allies, and divert attention from what should be our principal objective -- gaining Allied cooperation in limiting chemical weapons proliferation. One proposal to impose sanctions on patent holders would undermine the U.S. patent system with no corresponding benefit in controlling chemical weapons.

We believe that more can be achieved through multilateral cooperation than through unilateral controls or threats of sanctions. Only if the world's principal trading partners support a common objective can controls of chemical weapons be achieved. Moreover, unilateral action leads inevitably to tangential disagreements over national sovereignty, the appropriate reach of U.S. extraterritorial controls and the like.

CMA urges, therefore, that Congress concentrate on pressing the Administration to move forward with agreements that our Allies are prepared to support. The Commerce and State Departments should seek to obtain unified Allied action before any additional controls are imposed on the export of technical data relating to the production of chemical weapons precursors. If the technical data is readily available in the international market, little will be achieved by having unilateral U.S. restrictions in place.

CMA does not support any unilateral expansion of U.S. export controls over technical data relating to precursor chemicals or other chemicals. New United States controls may encourage the belief that Government is prepared to impose restrictions even if the only effect is to yield markets to other nations. That is precisely the wrong message to be sending to our major trading partners on this important issue. Expanded controls on technical data should be imposed only if our Allies will join in such restrictions. Also, any such controls should be limited to only what is necessary to prevent chemical weapons manufacture. The existing controls could be improved by standardizing nomenclature, clarifying the applicability of the controls, and expanding the use of electronic filing systems.

Our members rely upon a free flow of data among their operating units and with licensors and licensees worldwide. If an exception is not established for such intra-company and inter-licensee transfers, additional controls on technical data could potentially create significant new burdens and costs for our industry that its overseas competitors do not face.

CMA members are concerned that new controls on chemical production equipment could slow acquisition in this country. Further, any problems with obtaining this equipment in the United States could cause foreign companies to look elsewhere on the world market for this same equipment. Much of the equipment required in the manufacture of chemical weapons is relatively unsophisticated. In fact, it is probably impossible to identify equipment which is specifically designed or modified to be capable of chemical weapons manufacturing. Again, the U.S. export control program for technical data and equipment will only work if other potential supplier nations are prepared to join in the same control regime.

Similarly, the Drug Enforcement Administration should seek to achieve Allied support for controls comparable to those recently adopted in this country to discourage the production, distribution and sale of illicit substances. One major problem for such a DEA initiative will be that the features of the proposed regulations that exceed DEA's statutory authority are unlikely to gain support among our Allies. By changing these aspects of the proposal, DEA could promote a stronger basis for Allied cooperation on this initiative.

IV. CMA Action and Future Steps Contributing to More Effective Export Control Implementation

CMA members have for many years maintained internal administrative systems to implement their export control obligations ranging from classifying products to determine the level of controls to applying for validated export licenses.

In light of the recent U.S. government emphasis on chemical exports and the increased controls to certain countries, members have voluntarily taken action to enhance the effectiveness of the U.S. governmental programs designed to prevent the spread of chemical weapons. We briefly describe these additional steps here and would be happy to respond to questions concerning them. We are also planning additional measures which we outline here[illegible]

a. Indus[illegible] Educational Programs. A strong consensus exists within our industry on the importance of enforcing the existing controls designed to prevent chemical weapons proliferation. Some member companies and their personnel are facing for the first time the greater attention that inevitably results from the increased level of controls and heightened public concern with recent events particularly in Iraq and Libya.

For these reasons, we have initiated and encouraged our members to carry out educational programs that will explain the current control regime and suggest procedures and practices for achieving compliance in large companies. We involve both technical and legal experts in these programs. Such educational efforts may lead to modifications in the procedures and practices that U.S. companies apply in implementing their export control programs. As already noted, many CMA member companies already have comprehensive compliance programs in place, and others are planning to expand their programs. We expect that these types of programs will do much to enhance compliance and that they are more productive than threats of additional sanctions.

b. Increased Vigilance against Attempted Improper Export Transactions. Our member companies are stressing to their personnel the need for increased vigilance concerning attempted improper export transactions. Thus, CMA members are acquainting their personnel with the kinds of information that raise suspicions about transactions and that require further inquiry and possibly consultation with U.S. enforcement officials as well as advice from legal counsel. This vigilance not only serves to prevent diversion of precursor chemicals but its existence also deters those who might attempt such improper conduct.

c. CMA To Serve as Clearing House in Supplying Export Control Information for Member Companies. Because of CMA's dealings with the responsible U.S. government agencies, CMA will perform the function of a clearing house for information that may assist member companies in achieving export control compliance. Thus, we are regularly informing our members of developments in Washington ranging from proposed regulatory changes to potential diversion threats. Our staff and counsel are available to assist with in-company programs by providing materials and, in appropriate cases, taking part in educational sessions.

d. Assistance to U.S. Government Enforcement Officials in Identifying Potential Diversion Situations. Our members recognize that the U.S. Government has limited resources available for attempting to detect and stop attempts at diverting U.S.-origin chemicals to weapons manufacture. For that reason, CMA has established a dialogue with enforcement officials in the U.S. Government. Our members are aware of this communications link and will utilize it from time to time in alerting U.S. Government officials to potential problems. CMA members are prepared to explore, if necessary, a means for making this channel somewhat more formal. However, we are not certain that this is necessary given the high degree of industry-government cooperation that already exists.

e. International Industry Cooperation in Preventing Diversion and Encouraging Education. As previously noted, CMA works closely with its counterparts organizations in Western Europe, Canada, Australia and Japan. We have begun to encourage those organizations and their members to initiate educational programs along the lines of those which we have undertaken in the United States. We expect to continue our cooperative efforts with a view to establishing inter-organizational programs that will promote compliance and discourage attempted diversions.

* * *

In sum, CMA wants to assist the United States Government in implementing existing export controls designed to prevent the spread of chemical weapons. At the same time, we want to encourage multilateral action that will involve the governments and industries of our major trade competitors. By taking such action, rather than initiating unilateral programs, the United States can have an effective regime which does not result in a competitive disadvantage to our industry.

I would be happy to answer any questions that you have concerning CMA's role in helping to prevent the proliferation of chemicals weapons.

STATEMENT TO THE
SENATE GOVERNMENTAL AFFAIRS COMMITTEE
AND
PERMANENT SUBCOMMITTEE ON INVESTIGATIONS
ON
THE PROLIFERATION OF BIOLOGICAL WEAPONS
BY
H. ALLEN HOLMES
ASSISTANT SECRETARY FOR POLITICO-MILITARY AFFAIRS
DEPARTMENT OF STATE
MAY 17, 1989

INTRODUCTION

Mr. Chairman, Members of the Senate Governmental Affairs Committee and its Permanent Subcommittee on Investigations:

I am pleased to appear before you today to discuss the foreign policy implications of the problem of biological weapons (BW) proliferation. These hearings are coming at an opportune time. We are presently witnessing a disturbing and dangerous trend in the increasing efforts by states to acquire biological weapons. The technology to produce them is improving, and the agents themselves are becoming ever more threatening.

I should like to state from the outset that the United States is adamantly opposed to the development, production, or use of biological weapons and we are committed to doing all we can to eliminate them from the world's arsenals.

I would like first to give you some background on the development of U.S. policy on biological weapons and on the present state of play in this area. I will then describe how we are working to achieve our goal of eliminating these weapons.

BACKGROUND

There are in fact two relevant international agreements, both of which have proven inadequate to prevent the proliferation of biological and toxin weapons. The 1925 Geneva Protocol prohibits the first use in war of chemical and biological weapons, but not their development, production, possession or transfer. The 1972 Biological and Toxin Weapons Convention (BWC) prohibits the development, production, stockpiling, acquisition, retention, and transfer of biological and toxin weapons.

The U.S. itself unconditionally renounced all aspects of biological warfare in 1969. President Nixon ordered the Department of Defense to draw up a plan for the disposal of existing stocks of biological agents and weapons. In 1970, this unilateral ban was extended also to cover toxins, that is, poisonous chemicals produced by living organisms. All research in the area of biological warfare has since been confined to the development of strictly defined defensive measures, for example, development of vaccines.

BIOLOGICAL AND TOXIN WEAPONS CONVENTION

The United States followed up these unilateral actions by leading the fight for an international ban, the 1972 Biological and Toxin Weapons Convention (BWC). Article I of the BWC, and the treaty's negotiating record, make clear, however, that protective and prophylactic activities are permitted.

The BWC was approved by the U.S. Senate on December 16, 1974 and entered into force on March 26, 1975. All U.S. military stocks of biological and toxin agents, weapons, equipment or means of delivery prohibited by the Convention had already been destroyed unilaterally. Facilities in the United States which had been built and used for biological or toxin weapons purposes were converted to other use. For example, military facilities at Fort Detrick, Maryland and Pine Bluff Arsenal, Arkansas, previously used for BW activities, are now the property of the U.S. Department of Health and Human Services and are used by the National Cancer Institute and the National Center for Toxicological Research.

After the BWC was completed, many thought that the security problem posed by biological and toxin weapons had been solved. However, this clearly is not the case. Despite the limitations of the BWC, which has no verification provisions, we have identified a number of compliance problems. In previous years and again in 1988, President Reagan reported to the Congress that the Soviet Union had continued to maintain an offensive biological warfare program and accompanying capability, and that the Soviet Union has been involved in the production, transfer and use of mycotoxins for hostile purposes in Laos, Cambodia and Afghanistan in violation of the 1972 Biological and Toxin Weapons Convention. Furthermore, we have yet to receive a satisfactory official explanation of the unprecedented outbreak of anthrax at Sverdlovsk in the Soviet Union in 1979.

Two review conferences for the BWC have been held, in 1980 and 1986, with the next scheduled for 1991. At the two review conferences, the United States confirmed that it is in full compliance with the BWC. At the second review conference, the United States expressed its concern that the Soviet Union, Laos, and Vietnam had violated the Convention. Several other States Party to the Convention also expressed concern about compliance. These concerns are reflected in the Final Declaration of the 1986 review conference, which notes statements that compliance with Articles I, II, and III of the BWC was "subject to grave doubt" and that efforts to resolve the concerns expressed had not been successful. Since then, our concerns have intensified as evidence mounts of BW proliferation, especially in areas of particular concern to us.

TECHNOLOGICAL ADVANCES

In addition, the rapid advance of technology in the biological field has led to another set of problems for the Convention. In many ways, recent progress in biological technology increases the ease of concealment of illicit manufacturing plants, particularly for biologically-derived chemicals such as toxins. Verification of the BWC, always a difficult task, has been significantly complicated by the new technology. The ease and rapidity of genetic manipulation, the ready availability of a variety of production equipment, the proliferation of safety and environmental equipment and health procedures to numerous laboratories and production facilities throughout the world, are signs of the growing role of biotechnology in the world's economy. They also make it easier for nations to produce the lethal agents banned by the Convention.

As advances are made in the field of biotechnology, the potential for using this technology for biological and toxin weapons increases commensurately. Not only has the time from basic research to mass production of lethal weapons decreased, but the ability to create agents and toxins with more optimal weapons potential has increased. Simply put, the potential for undetected breakout from treaty constraints has increased significantly.

BIOLOGICAL WEAPONS PROLIFERATION

When the BWC was negotiated, only the United States acknowledged having biological weapons. In contrast to the openness we have practiced regarding our military programs, the Soviets, to date, have never officially acknowledged having a biological weapons program, and in fact only admitted in 1987 having a CW program.

Today a number of countries are estimated to be working to achieve a BW capability. Our information on which states are involved in BW programs is based on extremely sensitive intelligence sources and methods and I would defer to the Intelligence Community to provide you a fuller description of these programs in closed session.

We are especially concerned about the spread of biological weapons in unstable areas and about the prospects of biological and toxin weapons falling into the hands of terrorists, or into the arsenals of those states which actively support terrorist organizations. To date, we have no evidence that any known terrorist organization has the capability to employ such weapons, nor that states supporting terrorism have supplied such weapons. However, we cannot dismiss these possibilities. If the proliferation of BW continues, it may be only a matter of time before terrorists do acquire and use these weapons.

U.S. BIOLOGICAL DEFENSE RESEARCH PROGRAM

The unilateral U.S. renunciation of BW in 1969 was accompanied by the recognition that maintaining a strong program to provide for defense against BW is essential for national security. That requirement is reflected in Article I of the Convention which permits production of biological agents and toxins in quantities required to develop protective measures. In today's circumstances, with the concerns about compliance, proliferation and rapid advances in biotechnology, the requirement for defensive measures is even greater than in 1969.

The BWC clearly permits research and development for protection against biological and toxin weapons. The U.S. biological defense research program is in full compliance with the provisions of the Convention. It is also open to public scrutiny. No other country even comes close in its openness.

ELIMINATING BIOLOGICAL WEAPONS

Vigorous action is needed to deal with the problems that I have just outlined. These problems are tough ones that will not be resolved easily or quickly. But we are determined to deal with them.

What do we need to do? We need to persuade states that are not parties to the BWC, particularly states in the Middle East, to renounce the option of possessing biological and toxin weapons. We have expressed our desire to have consultations with the Soviets under Article V of the BWC, and this continues to be our position. We also need to explore possible means for strengthening the international norms against biological weapons.

With respect to the Soviet Union, we have repeatedly raised our concerns about noncompliance both through diplomatic channels and at the 1980 and 1986 review conferences. Fortunately, the use of "yellow rain" appears to have stopped several years ago. However, the Soviet response to our compliance concerns has not been satisfactory. I might add that it is not primarily a matter of explaining the anthrax outbreak at Sverdlovsk in 1979. After ten years, we can probably never know with certainty what happened. At this stage, it is more important to resolve our concerns about the very unusual military biological facility in Sverdlovsk that was reportedly the source of the outbreak. That facility still exists and raises serious apprehensions.

We continue to believe that the Soviet Union must deal seriously with our concerns and resolve them. We urge the new Soviet leadership to demonstrate some "new thinking" in this important arms control area.

In addition to ensuring that states fulfill their commitments not to possess biological or toxin weapons, we must persuade additional states to make that important commitment. Currently more than 110 states have renounced the option of possession of biological and toxin weapons by becoming parties to the BWC. Unfortunately, while most states in the Middle East have signed or acceded to the Convention, only about half have ratified it and deposited their instruments of ratification, the legal steps necessary to become full parties to the Convention. A number of these states have said that they will not take these actions until their neighbors do so. We need to break this vicious circle.

We believe that it would be in the interests of all states in the Middle East to eliminate the spectre of biological warfare from this already very volatile region. For that reason, we have recently renewed our effort to bring all states in the Middle East into the BWC. We will persist in this attempt to break the vicious circle.

We are also carefully considering whether export controls could help reinforce our efforts to prevent the acquisition of biological and toxin weapons by other countries. Our preliminary impression is that such controls can play only a minor role. From a technical standpoint, unfortunately, the problem we face is much more difficult even than curbing the spread of chemical weapons. The equipment needed is all dual-use, common and not very expensive. There are many suppliers around the world. In contrast to CW agents, there are no real precursor materials for biological agents. While states seeking a CW capability may need hundreds of tons of precursor chemicals, a state with a BW program needs only a tiny quantity of disease-producing organism as a seed stock. For these reasons, an export control regime analogous to that coordinated by the 19 countries belonging to the Australian Group for chemical precursors seems to offer little benefit.

In addition to resolving compliance issues and promoting broader adherence to the BWC, we should consider new and innovative approaches to making the international arms control regime for biological weapons more effective.

One way to strengthen the regime is to strengthen international reaction to deal effectively with proven violations of the ban on use embodied in the 1925 Geneva Protocol. The Paris Conference on Chemical Weapons Use could be a good example of an initial step to build an international consensus. But there must be concrete actions, including international sanctions, to put some teeth into the reaction.

Another way to strengthen the regime is through additional confidence-building measures to create greater openness about biological activities. The United States has taken the lead here. I doubt that any other state anywhere can match the openness we already practice with regard to our defensive research. We need to push others, especially the Soviet Union, to match this openness.

We have joined with other States Party to the BWC in agreeing that more information should be made available concerning legitimate biological research activities. By creating greater openness in these areas, we hope that the norm against biological weapons created by the BWC can be strengthened. The United States joined with others at the second review conference in calling for an annual exchange of information on each Party's research activities using the United States' policies on program openness as the standard.

Furthermore, we should continue programs where researchers from different countries work for extended periods in each other's laboratories. It would be more difficult to conceal significant research programs or intentions from qualified exchange scientists than it would be to fool inspectors making a brief, one-time visit.

We must continue to strive to prevent BW proliferation by reinforcing the moral, legal and political constraints against BW and, where feasible, seek to prevent states from obtaining sensitive materials and technology for BW purposes. This will be a particularly difficulty task and, quite frankly, we do not have the answers yet on how to achieve this. We do know that we cannot do it alone. Our efforts to constrain BW proliferation will require a sustained multilateral approach, involving both U.S. leadership and cooperation with friends and allies.

TESTIMONY ON BIOLOGICAL AND TOXIN WEAPONS BEFORE THE SENATE GOVERNMENTAL AFFAIRS COMMITTEE AND ITS PERMANENT SUBCOMMITTEE ON INVESTIGATIONS

BY

JIM HINDS

Deputy Assistant Secretary of Defense for Negotiations Policy

17 May 1989

I appreciate the opportunity to address this Joint Hearing on the military problems associated with the proliferation of biological and toxin weapons. I will refer to them today collectively as biological weapons or BW.

Biological weapons in the hands of non-signatories or violators of the 1972 Biological and Toxin Weapons Convention (BWC) are of grave concern to the Department of Defense. These weapons are insidious, they are extremely difficult to defend against, and they have spread to a number of nations over the past decade. In an era of erosion of the international norms against the use of chemical weapons, the likelihood of the use of biological weapons against our military forces is growing.

PROLIFERATION

When the BWC was signed in 1972, four states were believed to possess biological weapons. Today, we judge that at least ten countries have confirmed or suspected offensive BW programs. Most of these are in the Third World. Some programs are still in the research and development stage. Weaponization and stockpiling may be years away. But other countries, such as the Soviet Union, currently have significant offensive capabilities. Little more can be said on the unclassified level. It is difficult to deal with this entire topic without discussing the threat and our vulnerability at the appropriate level of classification in closed hearings. I urge the Committee or individual members to allow me to arrange for such briefings.

NATURE OF THE THREAT

Biological weapons in the hands of any potential hostile forces pose a significant potential threat to U.S. military forces in Europe and in the Middle East. Such weapons have the potential to cover large areas and can be employed with no warning. On a battlefield, the onset of symptoms is likely to be the first indication that forces are under BW attack. Biological weapons offer a spectrum of effects from incapacitation to death. And a range of employment scenarios can be envisioned, from the assassination of an individual all the way to large area employment on the strategic level. The development of BW programs can easily be concealed within small scale facilities with no specific BW signature -- such as building configuration. Indeed, BW production can be hidden in apparently legitimate operations such as pharmaceutical production plants, and BW weapons can be integrated into conventional ammunition storage.

In short, biological weapons are poor candidates for successful arms control. Compliance with the BWC by its parties cannot reliably be verified when a violator undertakes to conceal its activities. The U.S. has foresworn the development or possession of these weapons, and abides by its Treaty commitments. Nevertheless BW continues to be developed elsewhere.

The continued development of these weapons by others requires that the U.S. maintain a defensive capacity to constrain the use of BW against our forces and blunt the effectiveness of an attack if it should occur. That requires us to continue effective defensive research programs designed to enable us to immunize, treat and defensively equip our military forces should they have to operate on a BW battlefield.

RELATIONSHIP OF THE BIOLOGICAL DEFENSIVE RESEARCH PROGRAM TO ARMS CONTROL

Our Biological Defense Research Program (BDRP) exists to provide this urgently needed protection. Its activities are efforts not only permitted under the BWC but the potential need for such programs by signatory nations is recognized in the language of the first Article to the Convention. The Article notes that prohibition of programs applies to biological agents and toxins "of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes." Our programs are fully consistent with these provisions. The international arms control community fully recognizes the right and need of states to provide for the defense of their forces under the BWC. In the two review conferences and one experts' meeting that have been held on the BWC, the existence of U.S. defensive programs was not an issue. We have pressed others to be as open in their defensive activities as we are in ours. In this context, our programs serve as a model. Others will testify to the openness of our BDRP and to the extent of international cooperation and participation in our program, including participation by communist states.

Some have questioned the growth in our biological defense program over the years. As I recall, after the BWC went into force, U.S. defensive programs virtually disappeared. That should have been expected. Military development programs are threat-based. The perception was that since we had just signed and ratified a BW treaty, there must be no threat. Less than five years later, in 1979, our growing concerns that the treaty was being violated were confirmed by, among other things, the accidental release of anthrax at the Soviet BW facility in Sverdslovsk. The threat continues to grow, as I have already stated. Our defensive programs have had to catch up and keep pace with the threat.

In view of our belated recognition of the threat, it is not surprising that the rate of increased spending should appear large. An increase from near-nothing will always show as a steep change. Some have suggested that better oversight of defensive research would be provided if the program were moved from DOD to another agency. I strongly oppose moving the BDRP to any other agency such as NIH. The provision of defensive materials is a responsibility of the Secretary of Defense. That responsibility should not be divided. Moving the function elsewhere would increase costs, decrease program effectiveness, and would not result in any more openness than exists today. Our researchers are proud of their contributions to general medical science. But the Defense Department's ultimate concern is with the effectiveness of the fighting force. We must ensure, therefore, that proper priority is given to defensive systems; that is, detectors, alarms, masks, and clothing. In sum, our BDRP is essential to national security, is in full compliance with the BWC, is the most open in the world, and is properly placed within the Department of Defense.

IMPLEMENTATION OF THE 1972 BWC

As a ratified treaty, the BWC has the force of law regarding activities of the U.S. government and U.S. citizens. At the time of our 1975 ratification and as late as the 1986 BWC Review Conference, the Executive Branch judgement was that no implementing legislation was required. That judgement primarily was based on the perception that potential violators were most likely to be States rather than commercial firms or private individuals. However, even in the last few years, two developments have occurred to lead us to conclude that implementing legislation probably is desirable. These are the explosion of biotechnology, in both basic research and applied technology, and the apparent interest in obtaining BW capabilities demonstrated by several nations.

I cannot emphasize too strongly, however, that we must proceed cautiously in this area. There are not only essential defense interests to protect, but many legitimate medical, academic, and commercial endeavors which must not be inadvertently curtailed or inhibited. For example, it is important that legislation not discourage scientists from legitimate and peaceful research for fear of irresponsible criminal prosecution. The Department of Defense is ready, however, to work with other Executive Branch Agencies and the Congress on this issue. If oversight is a concern, we are willing to work with Congress to ensure that our vital defensive research and development programs can continue, within the Department of Defense where they can receive the priority and funding necessary for them to remain viable. I encourage these Committees in their further interest in this defense issue.

I have with me today Dr. Billy Richardson from the Office of the Assistant to the Secretary of Defense for Atomic Energy, who will describe the U.S. Biological Defense Research Program.

DR. BILLY RICHARDSON

DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE (ATOMIC ENERGY)(CHEMICAL MATTERS)

I THANK YOU FOR THE OPPORTUNITY TO ADDRESS THIS COMMITTEE ON THE ISSUES OF BIOLOGICAL WARFARE PROLIFERATION AND THIS NATION'S BIOLOGICAL DEFENSE PROGRAM. I AM DR. BILL RICHARDSON, DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE FOR CHEMICAL MATTERS. IN THIS POSITION, I SERVE AS THE OFFICE OF THE SECRETARY OF DEFENSE (OSD) FOCAL POINT FOR ALL CHEMICAL AND BIOLOGICAL DEFENSE PROGRAM RESEARCH, DEVELOPMENT AND ACQUISITION MATTERS. MY JOB IS TO DIRECT AND ORCHESTRATE THE ACTIONS OF THE MILITARY SERVICES IN ORDER TO PROVIDE THE BEST POSSIBLE PROTECTION FOR OUR MEN AND WOMEN IN THE ARMED SERVICES. WHEN WE SPEAK OF THE BIOLOGICAL DEFENSE PROGRAM, WE ARE TALKING ABOUT A DEFENSIVE EFFORT WHICH IS PART OF A TOTAL PROGRAM TO DETER CHEMICAL AND BIOLOGICAL WARFARE AND TO PROTECT U.S. FORCES AGAINST THE EFFECTS OF SUCH WARFARE SHOULD DETERRENCE FAIL.

TODAY, I WOULD LIKE TO EMPHASIZE SEVERAL CRITICAL POINTS CONCERNING THE DEPARTMENT OF DEFENSE CHEMICAL AND BIOLOGICAL DEFENSE PROGRAM.

- WE HAVE A REAL AND GROWING THREAT TO OUR MILITARY FORCES.
- THE BIOLOGICAL WARFARE THREAT IS MORE SURREPTITIOUS THAN THE CHEMICAL THREAT AND IS MORE DIFFICULT, BUT NOT IMPOSSIBLE, TO DEAL WITH.
- THE UNITED STATES SIGNED AND RATIFIED THE 1972 BIOLOGICAL WEAPONS CONVENTION OR BWC. WE DO NOT AND WILL NOT PRODUCE BIOLOGICAL WEAPONS NOR WILL WE PERFORM BIOLOGICAL WEAPONS RESEARCH AND DEVELOPMENT.

- THE BWC HAS NO VERIFICATION MECHANISM, SO WE NEED TO DEVELOP DEFENSES AGAINST ENEMY USE OF BIOLOGICAL WEAPONS.
- SINCE OUR RATIFICATION OF THE BWC, NO OTHER NATION HAS ACCUSED US OF DEVELOPING OR PRODUCING BIOLOGICAL WEAPONS.
- FINALLY, OUR PROGRAMS ARE CONDUCTED UNDER THE STRICTEST SAFETY PROCEDURES AND ARE UNCLASSIFIED TO THE MAXIMUM EXTENT POSSIBLE.

ALONG WITH THE PROLIFERATION OF CHEMICAL WARFARE, THE PROLIFERATION OF THE CAPABILITY TO CREATE BIOLOGICAL WEAPONS POSES A GROWING THREAT TO OUR NATIONAL SECURITY. AS PREVIOUSLY NOTED, AT LEAST TEN NATIONS ARE KNOWN OR SUSPECTED TO HAVE ON-GOING BIOLOGICAL WARFARE PROGRAMS. AS THE OSD FOCAL POINT FOR CHEMICAL AND BIOLOGICAL DEFENSE, THAT WORRIES ME GREATLY.

THE INDICATIONS OF A CHEMICAL ATTACK ON OUR FORCES WOULD NORMALLY BE ALMOST IMMEDIATE. WE WOULD HAVE SOME OVERT INDICATION OF THE ATTACK SUCH AS, BOMBS GOING OFF, INCOMING ARTILLERY OR ENEMY AIRCRAFT OVERHEAD. OUR DETECTORS WOULD ALARM QUICKLY, AND UNPROTECTED PERSONNEL WOULD BEGIN IN SHORT ORDER TO EXHIBIT CHEMICAL POISONING SYMPTOMS.

HOWEVER, A BIOLOGICAL ATTACK COULD BE FAR MORE SURREPTITIOUS. THESE AGENTS CAN BE DELIVERED BY A NUMBER OF MEANS -- THROUGH THE WATER SUPPLY, IN THE AIR, IN FOOD, BY ANIMALS, ETC. SINCE SOME AGENTS ARE INFECTIOUS, THE SYMPTOMS MIGHT NOT BE IMMEDIATELY APPARENT. IN FACT, THE ENEMY COULD DELIVER SOME AGENTS HOURS OR DAYS AHEAD OF TIME. OF GREAT CONCERN IS OUR COMPLETE LACK OF DETECTION AND ALARM SYSTEMS IN

THE FIELD FOR BIOLOGICAL WEAPONS. WE MAY NOT EVEN KNOW WE ARE UNDER ATTACK UNTIL IT IS TOO LATE TO REACT WITH EVEN THE LIMITED MEANS AVAILABLE TO US TODAY.

THE UNITED STATES DEPARTMENT OF DEFENSE DOES NOT HAVE A BIOLOGICAL WARFARE PROGRAM, AND I MUST EMPHASIZE THAT POINT AS STRONGLY AS POSSIBLE. THIS COUNTRY IS A SIGNATORY TO AND IN FULL COMPLIANCE WITH THE 1972 BIOLOGICAL WEAPONS CONVENTION. AS A MATTER OF NATIONAL POLICY, WE LONG AGO UNILATERALLY DESTROYED OUR BIOLOGICAL WEAPONS STOCKPILE. WE DO NOT AND NEVER WILL PRODUCE BIOLOGICAL WEAPONS OR CONDUCT ANY RESEARCH INTO HOW TO PRODUCE THEM.

HOWEVER, THE BWC HAS NO VERIFICATION MECHANISM, AND WE HAVE EVIDENCE OTHER NATIONS ARE VIOLATING IT. THEREFORE, THE UNITED STATES AND ITS ALLIES MUST DEFEND AGAINST THE EFFECTS OF THOSE OFFENSIVE BIOLOGICAL WARFARE PROGRAMS. TO DO OTHERWISE WOULD BE MILITARILY NEGLIGENT. AS A RESULT, WE AND OUR ALLIES HAVE PROGRAMS FOR RESEARCHING AND DEVELOPING METHODS OF MITIGATING ANY ENEMY USE OF BIOLOGICAL WARFARE. SOME OF THESE PROGRAMS ARE COOPERATIVE, AND WE FREQUENTLY SHARE INFORMATION.

EVER SINCE WE RATIFIED THE BWC, NO OTHER NATION, NOT EVEN OUR ADVERSARIES, HAS ACCUSED US OF VIOLATING THE CONVENTION. THE INTERNATIONAL BIOLOGICAL DEFENSE RESEARCH COMMUNITY RECOGNIZES OUR PROGRAM AS PERHAPS THE MOST OPEN IN THE WORLD; THEY DO NOT CONSTRUE IT TO BE A COVER FOR THE DEVELOPMENT OF AN OFFENSIVE BIOLOGICAL WEAPONS PROGRAM.

ALL OF THESE BIOLOGICAL DEFENSE PROGRAMS ARE UNCLASSIFIED. I CAN ASSURE YOU, WE HAVE NO SPECIAL ACCESS PROGRAMS FOR BIOLOGICAL DEFENSE THAT VIOLATE ANY TREATIES. THE ONLY CLASSIFIED ITEMS IN OUR PROGRAM ARE THOSE DEALING WITH INTELLIGENCE SOURCES FOR OUR THREAT DATA, SPECIFIC DETAILS OF THE THREAT SUCH AS EMPLOYMENT CONCEPTS AND PLANS, AND DETAILS OF OUR OWN SPECIFIC VULNERABILITIES TO BIOLOGICAL ATTACK. WE ROUTINELY CLASSIFY SIMILAR INFORMATION IN OTHER DEFENSE PROGRAMS.

WE HAVE A BROAD BASED JOINT PROGRAM FOR BOTH CHEMICAL AND BIOLOGICAL DEFENSE. FOR EASE OF USE AND ECONOMY, AS WELL AS TO DEAL WITH THE DIVERSE NATURE OF THE THREAT, MANY OF THE SYSTEMS WE ARE DEVELOPING AND FIELDING MUST WORK EQUALLY WELL FOR BOTH CHEMICAL AND BIOLOGICAL DEFENSE. FOR EXAMPLE, MASKS, GLOVES AND OVERGARMENTS PROVIDE PROTECTION AGAINST CHEMICAL AGENTS AND AGENTS OF BIOLOGICAL ORIGIN, LIKE TOXINS. ONE OF OUR MOST IMPORTANT HARDWARE PROJECTS IS THE DEVELOPMENT OF A GENERIC DETECTION AND WARNING SYSTEM FOR BOTH CHEMICAL AND BIOLOGICAL AGENTS.

IN THE MEDICAL RESEARCH AREA, MANY OF YOU ARE FAMILIAR WITH THE SPECTACULAR SUCCESSES AMERICAN MEDICINE HAS MADE IN THIS CENTURY IN COMBATTING THE SCOURGE OF DISEASES THAT ONCE RAVAGED MANKIND. COMMON KILLERS LIKE SMALL POX HAVE BEEN ESSENTIALLY ELIMINATED WHILE OTHER LESS THREATENING DISEASES LIKE POLIO AND RUBELLA ARE COMING UNDER CONTROL. TODAY, THE UNITED STATES HAS AN AGGRESSIVE PROGRAM TO TRY TO CONTROL THE SCOURGE OF AIDS.

THE COMMON THREAD IN THE ELIMINATION OF THESE DISEASES IS THE USE OF SMALL AMOUNTS OF THE AGENT IN QUESTION -- UNDER STRICTLY CONTROLLED CONDITIONS -- TO DEVELOP AND TEST THE ANTIDOTE, VACCINE OR OTHER PROTECTIVE SYSTEM. TO THOSE WHO MIGHT QUESTION WHETHER THIS USE OF THESE MINUTE AMOUNTS MIGHT BE A FIRST STEP IN DEVELOPING A U.S. BIOLOGICAL WARFARE CAPABILITY, AN OFFENSIVE CAPABILITY, I MUST REITERATE THIS IS TOTALLY UNTRUE. WE ARE A NATION BASED ON LAW AND STRICT ADHERENCE TO THE LAW. THE 1972 BWC -- WHICH BECAME THE LAW OF THE LAND WHEN RATIFIED BY THE SENATE -- AND OUR STRICT NATIONAL POLICY ENSURE WE WILL NOT DEVELOP AN OFFENSIVE BIOLOGICAL WARFARE CAPABILITY. WE FULLY RESPECT AND UPHOLD THE LAW AND NATIONAL POLICY IN OUR WORK. THE PRESIDENT, THE CONGRESS AND THE AMERICAN PEOPLE DO NOT EXPECT ANY LESS. IN ADDITION, SOME OF THE MOST PROFESSIONALLY QUALIFIED SCIENTISTS IN THE COUNTRY, BOTH WITHIN THE DOD AND AT OUR CONTRACTORS, PARTICIPATE IN THE PROGRAM. THEY ARE FAMILIAR WITH THE TREATY AND NATIONAL POLICY. THEIR WORK IS FREQUENTLY PUBLISHED IN PROFESSIONAL PEER-REVIEWED JOURNALS.

BESIDES HAVING A LEGAL PROGRAM, WE ALSO HAVE A SAFE PROGRAM. WE CONDUCT OUR BIOLOGICAL DEFENSE RESEARCH UNDER THE STRICT GUIDELINES OF THE CENTERS FOR DISEASE CONTROL - NATIONAL INSTITUTES OF HEALTH. IN FACT, OUR DOD STANDARDS, AS REFLECTED IN DEPARTMENT OF DEFENSE AND SERVICE REQUIREMENTS, MEET OR EXCEED THOSE GUIDELINES. THE CDC/NIH GUIDELINES ARE THE SAME ONES USED BY CIVILIAN PRIVATE AND PUBLIC MEDICAL RESEARCH ORGANIZATIONS.

TO ENSURE THESE PROGRAMS REMAIN TOTALLY RELATED TO SAFELY CONDUCTING DEFENSIVE RESEARCH, THEY UNDER GO A RIGOROUS REVIEW DURING THE DEPARTMENT'S PLANNING, PROGRAMMING AND BUDGETING PROCESS. I, AND MANY OTHERS WITHIN OSD AND AT THE INTERMEDIATE HEADQUARTERS, HAVE AMPLE OPPORTUNITY TO INTERVENE AND QUESTION EVERY ONE OF THESE PROGRAMS. MEDICAL RESEARCH PROGRAMS RECEIVE ADDITIONAL FORMAL POLICY AND SAFETY REVIEW BY THE ARMED SERVICES BIOMEDICAL RESEARCH EVALUATION AND MANAGEMENT (ASBREM) COMMITTEE. THE ASBREM ALLOWS GENERAL OFFICERS FROM ALL SERVICES TO REVIEW THE PROGRAMS. THE ARMY SCIENCE BOARD, THE BOARD ON ARMY SCIENCE AND TECHNOLOGY, AND THE ARMY AUDIT AGENCY ARE ALSO INVOLVED. IN ADDITION, THE INSPECTOR GENERAL AND ARMY SAFETY ORGANIZATIONS ROUTINELY INSPECT OR REVIEW OUR PROGRAMS. WE HAVE RECENTLY RECEIVED EXTERNAL REVIEWS BY SUCH ORGANIZATIONS AS THE GENERAL ACCOUNTING OFFICE, CONGRESSIONAL COMMITTEES AND THEIR SURVEYS AND INVESTIGATIONS STAFFS.

THE ARMY, AS THE DOD EXECUTIVE AGENT FOR CHEMICAL AND BIOLOGICAL DEFENSE, HAS AGGRESSIVELY PURSUED SEVERAL PROJECTS TO ENHANCE PROGRAM SAFETY. THESE INCLUDE:

- DEVELOPING A NEW ARMY REGULATION AND PAMPHLET WITH THE ASSISTANCE OF THE BIOLOGICAL TECHNICAL COMMUNITY (INCLUDING THE CDC). THE DOCUMENTS WILL BE PUBLISHED AFTER THEY COMPLETE FINAL COORDINATION (BY THE END OF THE YEAR). CDC-NIH AND OTHER AGENCIES WILL REVIEW THE FINAL DOCUMENTS.
- REQUIRING ALL ARMY ELEMENTS AND CONTRACTORS TO COMPLY WITH THE CDC GUIDELINES. THESE GUIDELINES WILL BE FULLY

IMPLEMENTED WITH FORMAL REVIEWS AND INSPECTIONS PROVIDED WHEN THE FINAL REGULATION AND PAMPHLET ARE PUBLISHED.

- ESTABLISHING A DEPARTMENT OF THE ARMY BIOLOGICAL SAFETY COMMITTEE CONSISTING OF THE ARMY STAFF, ARMY SECRETARIAT AND MAJOR COMMAND REPRESENTATIVES TO PROVIDE DIRECTION, CONTROL AND POLICY.
- PUBLISHING DA MEMO 5-3 WHICH CLEARLY DELINEATES BIOLOGICAL SAFETY RESPONSIBILITIES WITHIN THE ARMY.
- CREATING WITHIN THE ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND A SAFETY DEPARTMENT WITH FOUR SAFETY PROFESSIONALS.

THE DOD ALSO COMPLIES WITH THE NATIONAL ENVIRONMENTAL PROTECTION ACT; WE DEVELOPED A PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT WHICH INDICATED THERE IS ONLY NEGLIGIBLE RISK TO THE PUBLIC FROM THIS PROGRAM. WE CORRECTED, OR WILL SOON FINISH CORRECTING, PAST DISCREPANCIES IDENTIFIED BY THE SENATE GOVERNMENTAL AFFAIRS COMMITTEE. WE HAVE ALREADY OFFERED THE DEPARTMENT OF LABOR THE OPPORTUNITY TO JOIN IN OUR INSPECTION AND SAFETY OVERSIGHT OF DOD AND CONTRACTOR LABS. WE ARE ALSO WILLING TO ROUTINELY WORK WITH THE COMMITTEE TO ADDRESS YOUR CONCERNS AND ANSWER YOUR QUESTIONS ABOUT THE CHEMICAL AND BIOLOGICAL DEFENSE PROGRAMS.

SOME CRITICS OF THE PROGRAM RECOMMEND PLACING THE MEDICAL ASPECTS OF BIOLOGICAL DEFENSE UNDER THE AUSPICES OF THE NATIONAL INSTITUTES OF HEALTH OR SIMILAR NON-DEFENSE ORGANIZATIONS. WE DISAGREE FOR SEVERAL REASONS. FIRST, IT WOULD SPLIT THE SECRETARY OF DEFENSE'S BIOLOGICAL DEFENSE PROGRAM BETWEEN TWO

EXECUTIVE AGENCIES AND SPLIT THE MEDICAL RESEARCH PROGRAM FROM THE "HARDWARE" PROGRAMS I JUST DESCRIBED. SECOND, CHEMICAL AND BIOLOGICAL DEFENSE ARE INTERWOVEN INTO OUR OPERATIONAL DOCTRINE. DOD PERSONNEL ARE BEST QUALIFIED TO PROVIDE OUR TROOPS WITH MATERIAL COMPATIBLE WITH THAT DOCTRINE. THIRD, THE NIH IS MOST CONCERNED WITH DISEASE THREATS TO THE UNITED STATES. BECAUSE OF OUR GLOBAL COMMITMENTS, THE BIOLOGICAL DEFENSE PROGRAM MUST PREPARE FOR GLOBAL THREATS. FOURTH, THE NIH WOULD NEED TO ESTABLISH A PROGRAM TO CONTROL CLASSIFIED MATERIAL. AS I NOTED EARLIER, OUR RESEARCH PROGRAMS ARE UNCLASSIFIED, BUT WE MUST PROTECT OUR INTELLIGENCE SOURCES AND FORCE VULNERABILITIES. TO BE EFFECTIVE, THE PROGRAM MUST QUICKLY RESPOND TO THIS CLASSIFIED INFORMATION.

AS BOTH MR. HINDS AND I HAVE NOTED AND REPEATEDLY REITERATED, WE FACE AN EVER GROWING, MORE DANGEROUS CHEMICAL AND BIOLOGICAL THREAT. THE UNITED STATES HAS RENOUNCED THE USE, POSSESSION AND DEVELOPMENT OF A BIOLOGICAL WARFARE CAPABILITY. BUT, SINCE OTHERS HAVE NOT, WE MUST SAFELY PROVIDE OUR SOLDIERS, SAILORS, AIRMEN AND MARINES WITH THE BEST POSSIBLE PROTECTION AGAINST THE GROWING BIOLOGICAL WARFARE THREAT. TO DO LESS WOULD ERODE THEIR CONFIDENCE IN US AND LEAVE THE UNITED STATES MORE VULNERABLE TO BIOLOGICAL WARFARE COERCION.

STATEMENT BY

COLONEL DAVID L. HUXSOLL

COMMANDER
U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES

BEFORE THE

GOVERNMENTAL AFFAIRS COMMITTEE

AND ITS

PERMANENT SUBCOMMITTEE ON INVESTIGATIONS

UNITED STATES SENATE

101ST CONGRESS

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I am Colonel David L. Huxsoll, Commander of the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID). The Institute is the lead laboratory of the U.S. Army Medical Research and Development Command (USAMRDC) responsible for the medical component of the Biological Defense Research Program (BDRP). The Department of the Army conducts the BDRP as the executive agent for Department of Defense (DoD). Coordination with the other services is achieved through a Joint Service Agreement and by the Armed Services Biomedical Research, Evaluation and Management Committee. I am pleased to be here today to provide information on the BDRP, and specifically on how the program relates to the subject of this hearing, the proliferation of biological weapons.

I would like to emphasize that the BDRP does not conduct any research and development related to offensive biological warfare; we have no biological weapons capabilities or programs. We are in strict compliance with the Biological Weapons Convention and with the existing U.S. policy first enunciated by President Nixon. The BDRP is conducted solely to enhance our ability to protect and defend the men and women of our armed services from the acknowledged worldwide threat of biological warfare. As you are all aware, the Biological Weapons Convention does not contain provisions for verification, and there is evidence of noncompliance with the Convention. The issue of the potential use of biological warfare agents by terrorists is of serious concern to all of us. A strong defensive program that provides medical and physical protection to U.S. forces serves as a deterrent to the use of biological weapons by hostile parties and constrains their weapons research, development and acquisition programs.

The BDRP is a research, development, and acquisition program designed to provide protection to U.S. Forces from potential biological warfare threats. The BDRP promotes and maintains a solid national defense posture, in consonance with national policy. The mission objectives of the program provide for: a) medical protection and treatment capabilities such as vaccines, drugs, and patient management, and test procedures and reagents for biological agent identification in clinical specimens, b) physical protective measures such as protective masks, clothing and shelters, c) decontamination capability and d) reconnaissance, detection and identification methods, particularly detection capabilities for environmental specimens in battlefield settings. The latter three objectives are pursued under the auspices of the chemical defense program in a combined chemical-biological defense effort.

Medical defense constitutes approximately two-thirds of the BDRP. The USAMRDC is the medical materiel developer, and develops its programs in response to requirements identified by the Army Medical Department combat developer, the U.S. Army Academy of Health Sciences.

Non-medical, combined chemical-biological defense efforts constitute approximately one-third of the Program. These efforts are directed by the U.S. Army Armament, Munitions & Chemical Command through its laboratory, the U.S. Army Chemical Research Development and Engineering Center (CRDEC), and by the U.S. Army Test and Evaluation Command at the Life Sciences Laboratory, U.S. Army Dugway Proving Ground. Defense materiel is developed by the parent command of both of these organizations, the U.S. Army Materiel Command, in conjunction with the combat developer, the U.S. Army Chemical School.

The BDRP is aligned to respond to the threat and intelligence information defined by the intelligence community. Intelligence, threat and U.S. vulnerabilities are classified in accordance with DoD policy as implemented by Army regulations. Classification authority is vested with commanders of major Army elements and their equivalents, is not subject to delegation, and is subject to review. The BDRP is open and unclassified. Congress, the United Nations, regulatory agencies, scientists throughout the world, public interest groups and the news media all have ready access to information about the U.S. BDRP.

Because the Program is displayed openly, not all of the attention directed to it is necessarily favorable. There are some who say that the U.S. Biological Defense Program encourages an international biological arms race. We do not believe this is the case. In accordance with Article X of the Biological Weapons Convention, information and biomedical products developed in the BDRP are shared freely throughout the world and foster mutual beneficial relationships and confidence. Thus, the BDRP can be viewed as discouraging, rather than encouraging, an international biological arms race. As I stated earlier, the BDRP is a deterrent and constrains the use of biological weapons.

There are some who claim that the distinction between offensive and defensive research is so fine as to be nonexistent. If this line of reasoning were true, it would apply equally to all biomedical research that is directed toward a better understanding of human disease. From the outset, defensive research is based on different postulates and hypotheses than is research directed toward "offensive" ends, and the rationale for data collection and analysis are different. At the basic research level, the laboratory techniques used would be very similar, but the objectives are markedly different. Beyond the basic research level, there is a marked divergence in the type of work that would be done. If a vaccine were to be produced, one would pursue ways of crippling, weakening or lessening the virulence of the agent in question so that it could be used in humans without fear of inducing disease. A vaccine would be produced under the stringent guidelines of the Food and Drug Administration regulations, and would have to receive FDA approval before use. This type of work is permitted by the Biological Weapons Convention. If, however, the goal were to create a weapon, the opposite objectives would be pursued. Efforts to enhance virulence or toxicity, and to produce enormous quantities of agent, far larger than those required for vaccine production, would be undertaken. In addition, the issues of stability, dissemination and weapons delivery systems would have to be addressed. These activities are clearly prohibited by the Biological Weapons Convention.

There are those who claim that USAMRIID and its scientists are second-rate. This claim is not consistent with the demonstrated performance of these individuals. Both in-house and contract BDRP scientists publish regularly in peer-reviewed scientific journals, and present their work at national and international symposia. A number of these scientists are internationally known subject area experts, and are invited routinely to consult with other national and international agencies. Many are officers of international scientific societies and on editorial boards of journals. A critical element in the job evaluations of USAMRIID research scientists, as in academic institutions, is publication of senior-author and co-author papers in peer-reviewed journals. In instances of unusual disease outbreaks, USAMRIID scientists are consulted routinely by other government agencies such as the CDC, NIH and USDA, as well as by multiple private organizations and by foreign colleagues in the private and public sectors.

A more serious charge levied against the BDRP is that it lacks scientific validity - that no science or program can develop defenses against all possible threats. There may be a grain of truth in this logic, but it does not obviate the need for a defensive program. There is no weapons system for which a 100% effective defense can be developed. Furthermore, it is the nature of warfare that for every weapons system developed, there is an effort to develop a defensive countermeasure against it. In the case of biological weapons, the U.S. has renounced retaliation in kind and focuses on defense. A military threat is defined as an adversary's intent and capability as compared to operational concepts and doctrine that define U.S. vulnerabilities. The "threat list" is not endless. Intelligence identifies threat agents upon which the program is focused. The BDRP seeks to develop generic approaches to protection and treatment that would address broad categories of threat agents, for example, immunoenhancers or antiviral drugs that are effective against multiple families of viruses.

Another major issue regarding the BDRP may be familiar to members of this committee because it was the subject of related subcommittee hearings in the 100th Congress. This issue is safety. The Subcommittee on Oversight of Government Management identified deficiencies in the Army's overall management structure for safety issues, and these deficiencies are being addressed in coordination with the subcommittee staff, the CDC and NIH, and the Department of Labor, as part of the Army's continuing effort to enhance the safety and safety management of its programs. It has been claimed that the BDRP poses a safety and health hazard to the public. However, as I testified last summer, the BDRP has an enviable safety record and accusations to the contrary have been addressed. Potential risks to the environment were analyzed exhaustively in the Programmatic Environmental Impact Statement on the BDRP. This analysis identified negligible risk to the general public or to the environment arising from the program, and small risks to the BDRP workforce, which are mitigated by operational safety policies and practices. There is simply no evidence that the BDRP is unsafe, but an abundance of evidence that it is safe.

Lastly, I am sure many of you are familiar with the argument that the medical portion of the BDRP should be directed by the National Institutes of Health rather than by the Army. The rationale for this argument is that the NIH is a better qualified and more credible organization. For a number of reasons, this seems to me to be inappropriate. It is important that the Secretary of Defense retain both the authority and the responsibility for national defense. Transfer of this military program, the medical defense aspects of the BDRP, to NIH, would require that the NIH, a civilian health agency, take on a military mission. This would require coordination and close integration not only with the U. S. Department of Defense, but with the armed forces of many allied nations. NIH would have to manage a military research and development program which must integrate with established military operational, acquisition, logistics and intelligence systems. In addition, NIH would have to integrate certain aspects of the biological defense program with the chemical defense program. DoD's ability to respond to a military problem would be compromised. This kind of action would be expected to greatly increase program costs. For example, could NIH provide highly trained, experienced personnel who can respond to outbreaks of exotic disease in military personnel and who are trained to operate in military settings? The BDRP as it currently exists can and does fulfill this mission. In addition, at least certain NIH personnel would need to work routinely with classified information regarding U.S. threat and vulnerabilities in order to direct the program appropriately.

Those who propose transfer of the medical portion of the BDRP to the NIH imply that this transfer would allay their fears and lack of trust in the Army. It is doubtful that such a transfer actually would end the discussions of biological defense issues and placate the critics. If the medical aspects of the BDRP were transferred to NIH, the NIH would then be reported to the U.N., under the confidence building measures of the Biological Weapons Convention, as the agency conducting the U.S. biological defense program. Furthermore, allocation of the classified intelligence information versus the unclassified program to two different organizations, one military and one civilian, would undermine public trust and confidence, as well as facilitate international disinformation programs. This would foster the misperception that the BDRP is in conflict with the provisions of the Biological Weapons Convention.

In addition to the considerations identified above, there is a scientific issue. The primary mission of the NIH is U.S. civilian health problems. The Army and the BDRP focus on the biological warfare threat to U.S. military forces, wherever they may be deployed. Thus, the Army is one of the few agencies that conducts and sponsors research on infectious diseases exotic to the U.S. The Army emphasis is on disease prevention and casualty management through mobile field medical facilities. The NIH emphasizes treatment of diseases confined to the U.S. with patient management through fixed medical centers. Army medical doctrine and training addresses non-physician medical personnel and buddy-aid. The NIH patient treatment paradigm is physician and patient. The NIH emphasizes basic research, and resulting product development normally is pursued by the commercial sector. Commercial development and "fielding" is motivated by the profit incentive. The Army integrates its basic research program with an established materiel development process, and thus is capable of taking a product, such as a vaccine or drug, from its inception through production and fielding. Through established channels of scientific interchange, there already exists coordination among BDRP scientists and those of the NIH, the CDC and the FDA. Finally, transfer of the biomedical portion of the program to NIH would not change any of the safety or environmental issues that have been raised.

In your letter of invitation you requested input on the extent of biological agent and toxin weapon proliferation worldwide. The intelligence community has stated that at least ten nations are suspected of possessing biological weapons development programs. This represents an increased threat over that of the past several years. I am particularly concerned about the resulting increased threat to our forces performing peace-keeping missions and operations short of war. Further details on the threat and the specifics of proliferation will have to be obtained from the intelligence community.

I was asked to discuss the nature of the threat presented to this country from the research and development programs for biological agents subsidized in other countries. Clearly, defensive research and development programs similar to our BDRP pose no threat at all.

Offensive, or weapons development programs, surely pose a threat, especially to U.S. forces stationed or deployed to certain areas of the world. In addition, there is always the terrorist threat. Again, U.S. forces located in certain areas of the world are perceived to be at the greatest risk from such programs. As I mentioned before, the "threat list" of agents is not endless. We believe that we can provide medical defenses against them.

What are the national security implications of this Nation's biological defense program? Those of us responsible for conducting the BDRP believe that the Program has positive implications for national security, and that the development of strong medical defensive measures serve to deter and constrain an adversary from using biological weapons. For example, the U.S. makes it clear that we can protect troops (using vaccines or pretreatment drugs), or that we can quickly identify and diagnose a disease caused by use of a biological weapon, treat the resultant casualties, and implement protective measures for the remaining force. Thus, most adversaries are discouraged from using such weapons against U.S. forces.

You also asked me to comment on the likelihood that vaccines and antibiotics produced by the BDRP will be able to protect military and civilian populations against release of "novel" biological or toxin agents by terrorists or others. This question requires a two part answer. First, the BDRP is a military program designed and focused to protect military personnel. It is not designed nor intended to provide protection to the civilian population. The U.S. Department of Health and Human Services, through the Centers for Disease Control, has the responsibility for medical protection of the civilian population. The Army and the BDRP cooperate closely with the CDC, and routinely share products such as investigational vaccines.

Second, it is difficult to address the issue of a "novel" biological agent without some sort of definition of such an agent. One definition might be: a genetically engineered organism that expresses a toxin or virulence factor not intrinsic to the parent organism. Biotechnology makes it possible that agents not currently considered threats might become threats in the future, because such technology potentially could be used to produce quantities of agents not readily available by traditional means. However, even if bacteria or viruses were genetically engineered for offensive purposes, and we have no evidence of this, they would, by definition, have to retain intrinsic properties that make them identifiable as a bacterium or virus. While to the uninitiated it would appear that genetic engineering would make it possible to alter an organism so extensively as to make it totally unrecognizable and unidentifiable, this is not, in actuality, the case. The BDRP addresses biological threats by the development of generic approaches to prophylaxis and therapy, and by maintaining and developing state-of-the-art approaches to rapid identification and diagnosis.

I was asked to comment on how the BDRP will protect animal or plant resources from terrorist releases of such injurious agents. Again, the answer in part is that the BDRP is a military program designed and focused to protect military personnel. The BDRP does not include any research and development efforts on plants. Protection of agricultural resources is the responsibility of the U.S. Department of Agriculture. However, many of the disease agents studied in the BDRP also are animal pathogens. In this regard, the BDRP cooperates closely with the U. S. Department of Agriculture, in particular with the Animal and Plant Health Inspection Service and the Plum Island Animal Disease Center. Many of the vaccines developed in the BDRP for human use are tested against the disease agents in animals, and have been shown to be effective. There is historical precedent for the use of BDRP products in animals, for example, in the outbreak of Venezuelan equine encephalitis that struck southern Texas, and in cases of Eastern equine encephalitis in whooping cranes in a U.S. wildlife preserve. Thus, although the BDRP is not designed for the protection of animal resources, it provides collaborative support to the appropriate U.S. agencies in the form of information, products and diagnostic assistance.

Finally, what is the relationship of the BDRP to our nation's concurrent arms control activities and initiatives? We believe that the openness of the program supports related arms control initiatives. The information and products derived from the BDRP are shared internationally. Research is published in the open literature and presented at national and international meetings. Investigational vaccines are provided on a collaborative basis. Diagnostic support is provided upon request, throughout the world, for the study of disease outbreaks. The BDRP is visible and accessible, both in the U.S. and to other countries, and allies, non-aligned nations and Third World nations look to the U.S. as a leader in biological defense. The proliferation of biological warfare capabilities speaks to the need for effective verification methods for the Biological Weapons Convention.

I thank you for the opportunity to present this testimony and will be happy to answer questions.

SECRET

ASSISTANT TO THE SECRETARY OF DEFENSE
WASHINGTON, DC 20301-3050

(ATOMIC ENERGY)

24 AUG 1989

Honorable John Glenn
Chairman
Committee on Governmental Affairs
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

Attached are the consolidated Department of Defense replies to the questions regarding the DoD Biological Defense Research Program which you submitted to Colonel David Huxsoll, Commander, U.S. Army Medical Research Institute for Infectious Diseases. These questions arose from the May 17, 1989 hearing before your Committee. The enclosure includes a classified annex.

I hope these responses will answer your concerns about the proliferation of biological warfare agents and will help the Committee to further understand the Biological Defense Research Program.

Sincerely,

Robert B. Barker

Enclosure
As stated

cc: Honorable William V. Roth

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REGRADE UNCLASSIFIED UPON
REMOVAL OF ATTACHMENT

SECRET

QUESTIONS ON THE BIOLOGICAL DEFENSE RESEARCH PROGRAM

Question 1a: What detection methods or devices do the U.S. armed forces rely upon for determining whether the U.S., its troops or its allies have been, or are being attacked by biological or toxin weapons?

Answer: The U.S. currently has no fielded detection devices for determining a biological warfare (BW) attack. The method signaling such an attack has taken place would be human illness or disease. With the exception of the "dipstick" test for T-2 mycotoxin, field detectors are not yet a reality. Laboratory analytical capability does exist for rapid identification of a lengthy list of organisms and toxins in clinical specimens.

Question 1b: Who, within the U.S. Government, has the responsibility for determining whether biological weapons have been used against the U.S.? Please reply indicating the chain of command at all involved agencies and institutions.

Answer: The initial evidence of a BW attack may be a sudden large outbreak of illness which could be identified in medical treatment facilities at the lowest operational level (e.g., field hospital). Environmental samples collected by advance teams and submitted for laboratory analysis could also provide preliminary evidence of such an attack. Even if an attack appeared to be in the form of other types of weapons (e.g., chemical), the possibility of attack by mixed munitions would need to be explored. Ultimately, the theater commander-in-chief makes the determination.

Question 2: The purpose of your program is to develop defenses against potential biological warfare threats to the military. Please explain the difference between an organism that has military significance and one that does not.

Answer: Pathogens are important to the military, either as potential BW threats, or as causative agents of natural diseases, or both. An organism has military significance if it produces disease that impairs military mission capability--throughout the spectrum of conflict from forward-deployed peace-keeping missions and national assistance programs through full scale, global warfare. This is true regardless of whether the organism is a naturally occurring, endemic organism or one delivered in the form of a biological weapon. A BW threat agent is defined as a biological agent which is assessed by the intelligence community as being developed and/or produced for weaponization. Furthermore, the significance of the threat to U.S. Forces is defined by the combat developer on the basis of the forces' vulnerability. For example, smallpox is a potential BW threat agent. It is not a significant threat at present because U.S. Forces are routinely immunized against smallpox, and the vaccine is effective against aerosol transmission of the disease.

Question 3: Why is the AIDS virus not considered a threat to military personnel as anthrax is?

Answer: AIDS is not assessed to be a BW threat agent because the characteristics of the agent and of the disease, in contrast to anthrax, are such that AIDS would have no practical, tactical or strategic value in a warfare context. The course of the disease is too slow to be a useful weapon. There is no evidence the AIDS virus can cause infection through aerosols, the primary means for dissemination of BW agents.

Question 4: Please provide the current DoD definition of a biological agent that constitutes a wartime threat and the characteristics that make it a threat.

Answer: A BW threat agent is one assessed by the intelligence community as being developed and/or produced for weaponization purposes. This definition encompasses the elements of intent and capability. An additional element of threat is U.S. Force vulnerability to the agent or weapon in question. Traditionally, the characteristics that make an organism a likely candidate for weaponization are: ease of production, predictability of disease, transmissibility by aerosol, stability, low contagiousness to prevent uncontrollable spread of the disease, an ability to withstand environmental conditions long enough to infect, and rapid action.

Question 5: Who in the chain of command has the authority to designate a biological organism as one of "military significance?" Does the Secretary of Defense have to make this determination? Do you have that authority?

Answer: The Commander of USAMRIID does not have this authority. He provides expert technical advice on the military medical significance of a given biological organism. This input, in combination with that provided by other elements of the USAMRDC, the Army Academy of Health Sciences, the Training and Doctrine Command and the intelligence community, is used in the determination of "military significance." The Service Chiefs are responsible for determining military requirements (military significance). At the level of Headquarters Department of the Army, the Deputy Chief of Staff for Operations and Plans is responsible for validating and determining the priority of military requirements. He is advised on medical priorities and requirements by The Surgeon General.

Question 6: Does AMRIID fund or contribute to any research programs that do not have specific military applications?

Answer: No. The medical Biological Defense Research Program (BDRP) conducted by USAMRIID supports basic and applied research focussed on the development of medical products and information that will provide protection to U.S. Forces from BW threats.

Question 7: Does the BDRP fund or support any biological agent defense research and development activities, either here or abroad, that is not based upon current threat intelligence information?

Answer: No. The BDRP addresses threats identified by the intelligence community. There are, however, unavoidable gaps in intelligence information. The Program is aimed at developing a broad spectrum of protective measures which function as deterrents to the use of BW against U.S. Forces. Thus, considerable emphasis is placed on the development of extensive diagnostic and identification capabilities for many families of potential threat agents. Such capabilities should serve to ensure that, in the future, the DOD is never again faced with the deficiencies of the early 1980's, when it was not possible to accomplish identification of potential BW agents in a timely and accurate fashion.

Question 8: Which countries currently receive funding through the BDRP extramural research program? Which countries currently receive funding through the USAMRIID extramural research program? Please provide all contracts, names of principal investigators, contract amounts, terms of contract, scope of research, and any and all progress reports, publications, final reports, scientific presentations, etc., that have resulted from this contract research.

Answer: See Enclosure 1.

Question 9: What policies are in place to ensure that foreign government contractors do not wittingly or unwittingly contribute to the proliferation of offensive biological agent capability through transfer of AMRIID/BDRP technology and "know how" to countries unfriendly to the U.S.?

Answer: Federal, DOD and Army acquisition regulations prohibit contracting with nations identified as unfriendly to the U.S. The research conducted in the BDRP does not involve offensive biological agent technology, nor does the work sponsored by USAMRIID in foreign countries. The BDRP/USAMRIID do not involve or possess any offensive biological agent capability. The technology and "know how" involved in the medical BDRP are common assets of disease prevention and treatment shared worldwide throughout the scientific and medical communities. It is the application of these technologies to biological defense that is militarily unique.

Question 10: In order to study the threat presented by certain biological threat agents, is it necessary to study methods of delivering those same agents?

Answer: The development of biological weapons, for whatever purpose, is specifically prohibited by the Biological Weapons Convention. Thus, no weapons or weapons delivery systems are used, nor are they necessary, for study of the threat posed by various agents. Because an aerosol is considered to be the most likely mode of delivery in a BW attack, the development of medical and other protective measures and the study of disease pathogenesis require the use of aerosols of agents under closely controlled laboratory conditions. Such aerosol studies, performed using special facilities, equipment and defined procedures--as described in the Centers for Disease Control-National Institutes of Health Biosafety Guidelines--to ensure occupational and environmental safety, do not in any way constitute studies of methods of delivery of biological threat agents. It is, however, requisite to simulate the conditions (i.e., natural environmental factors such as sunlight, temperature, wind) that would prevail during BW agent delivery to evaluate them for protective purposes.

Question 11: In order to understand the threat presented by certain potential biological threat agents, is it not necessary to gather information on the infectious properties of the weapon agent; the dosage required for infection; and the degree or severity of infection produced by exposure to the agent under differing physiological and environmental conditions?

Answer: Yes. The development of protective vaccines and drugs requires the development of experimental animal models of disease caused by various biological threat agents. Validation of such models requires that the baseline information on parameters such as the dose required for infection, severity, and pathogenesis of infection be identified. These scientific efforts are largely common with those used in the civilian biomedical research community for the development of vaccines and drugs to combat cancer, heart disease, diabetes, and infectious diseases. In addition, militarily relevant diseases that occur naturally in humans are studied in collaboration with international and foreign government health agencies under strict provisions of guidance and disclosure. See the classified addendum for additional information.

Question 12: What is the DoD policy with respect to the use of vaccines developed by the BDRP of which AMRIID is a part? What are the policies, procedures and regulations for developing and providing new vaccines to U.S. Forces? What triggers an inoculation of U.S. troops? How long after the detection of an unknown BW agent attack would U.S. troops be prepared to defend the U.S. or its allies?

Answer: The U.S. Army is the DOD executive agent for biological defense. As such, the U.S. Army Surgeon General is largely responsible for establishing stockpiles of relevant products according to the requirements identified by each of the military departments. These vaccines are developed in compliance with all current Federal laws, regulations, rules, and guidelines which apply to vaccine development, testing and storage. The USAMRDC endeavors to find commercial firms which are interested in producing a product developed by the Army in return for a favorable product purchase price. Where no commercial market exists for the vaccine, it is produced and stored under contract. An interim plan for distribution of certain contingency vaccines has been promulgated by the Surgeon General and a copy of this is enclosed (Enclosure 2). Para 5-19 of Army Regulation 40-562, NAVMEDCOMINST 6230.3, AFR 161-13 and CG COMDTINST M.6230.4D titled "Immunizations and Prophylaxis" specifies a slightly different procedure (Enclosure 3). A formal plan is being staffed and will result in a regulation rectifying the differences and defining the parameters for the release of any contingency vaccine.

Immunization of U.S. troops could be triggered by various events. Specific threat information provides the priority impetus for immunization. Certainly, an attack on a troop unit, ship, air base, etc. would trigger immunization of all personnel staged in or deployable to that theater of operations. Similarly, finding a munition containing biological agent would trigger immunization with relevant vaccines. Defense against a BW attack would begin immediately and utilize all existing medical and physical protective measures. In order to defend medically against a BW agent attack, the agent would have to be identified, at least as to its type. This could be accomplished by a detector or by the diagnosis of illness in humans or animals. Medical protection would be augmented by physical protection. Prior to the availability of a vaccine, troops could be protected medically by the administration of antiviral drugs or immunomodulatory compounds. Our use of genetic engineering to develop new vaccines potentially reduces the time to field a new vaccine from six-to-ten years to several months.

Question 13: In your formal testimony [COL Huxsoll], you stated that "we have no evidence of" bacteria or viruses genetically engineered for offensive purposes. Please explain this statement, since it appears to contradict a series of allegations made in the Wall Street Journal in April/May, 1984, to the effect that the Soviets are engaged in research involving the construction of a virus, infectious to man, that is armed with the gene for cobra venom?

Answer: The statements in the article referred to are not supported by U.S. intelligence data. In theory, genetic engineering provides a tool with which the efforts described in the Wall Street Journal article could be accomplished, but we have no evidence to date that they have. See the classified addendum for additional information.

Question 14: The 1986 DoD report on the Biological Defense Program states that as a result of the neglect of the program in the 1970's, the U.S. cannot adequately defend itself against "conventional" biological agents such as anthrax. Do you agree with that assessment? If therapies in the form of vaccines and antibiotics are available for treating anthrax, how do you explain DoD's assessment that the U.S. cannot adequately defend its service personnel against anthrax?

Answer: The assessment in the 1986 report is accurate. Current vaccines, particularly the anthrax vaccine, do not readily lend themselves to use in mass troop immunization for a variety of reasons: the requirement in many cases for multiple immunizations to accomplish protective immunity, a higher than desirable rate of reactogenicity, and, in some cases, lack of strong enough efficacy against infection by the aerosol route of exposure. Antibiotics could not be delivered fast enough for mass treatment in the event of a BW attack with anthrax. Such an attack, most likely in the form of an aerosol, would cause pulmonary anthrax, which is difficult to diagnose and has an extremely rapid time course leading to death. Current efforts in vaccine development are directed to addressing the deficiencies in existing vaccines outlined above.

Question 15: How significant a public health problem is anthrax in the military?

Answer: Anthrax is considered to be a BW threat, not a significant public health threat. As with many diseases such as typhoid, cholera, polio, plague, etc., anthrax poses a very limited civilian or military public health problem because its incidence is minimized through control measures used in meat processing, production of animal feed, programs for the control of infectious diseases in livestock and public sanitation programs.

Question 16: How significant a public health threat is Arenavirus exposure to service personnel? Since AMRIID is conducting research on a vaccine against Lassa fever, a disease that is geographically restricted to the north central part of Africa, does this mean that certain African states are developing an offensive biological agent weapons capability using Lassa fever -- a disease to which there is no known treatment or cure?

Please explain the level of technical sophistication and biological sciences infrastructure that a country would need to safely conduct research on Arenavirus.

Answer: Arenaviruses, and the hemorrhagic fever diseases caused by them, could be a significant problem to military personnel deployed or stationed in various parts of the world. This is particularly true in west central Africa and certain parts of South America. These viruses cause disease in their natural settings, and are thus endemic disease threats which could significantly impair military capabilities. There is no reason to believe that any African state is developing an offensive capability using Lassa fever. The BDRP/USAMRIID undertakes vaccine and drug trials against arenaviral diseases in support of efforts to develop a responsive spectrum of protective products. Vaccine development efforts for Lassa fever have been curtailed. The available therapy for Lassa fever is immune globulin purified from patients who recovered from the disease, with or without the antiviral drug ribavirin. Ribavirin is thought to have efficacy in treatment of severe forms of Lassa fever.

The facilities, equipment and precautions necessary to safely conduct research on arenaviruses depend on the types of procedures being performed and on the endemicity, or lack thereof, of that particular organism in the surrounding environment. The World Health Organization identifies Lassa fever virus as posing a high risk to the individual laboratory worker, and a low community risk, because it is not readily transmitted from man to man. The WHO Laboratory Biosafety Manual recommends the use of special diagnostic laboratories for the handling of Lassa fever virus. Such laboratories correspond approximately to those described as biosafety level 3 by the U.S. Centers for Disease Control. Thus, the level of technical sophistication and infrastructure required for the safe conduct of research on hazardous arenaviruses corresponds to that which one would find in a large U.S. university or in a hospital setting where certain infectious diseases were studied intensively. See the classified addendum for additional information.

Question 17: How likely is it that terrorists will use biological agents against U.S. military personnel or facilities in preference to the use of bombs or chemical agents to make a "political" statement?

Answer: See answer in classified addendum.

Question 18a: You have stated that the transfer of the biomedical portion of the BDRP to a civilian biomedical research and outreach agency like NIH would compromise DoD's biological response program and possibly compromise the mission of the NIH.

Please explain how the transfer of non-military portions of the BDRP to the NIH would compromise its mission.

Answer: There are no "non-military" portions of the BDRP. The biomedical research conducted in the program is focused on militarily relevant problems with the goal of developing products and information for use in medical defense of U.S. troops against biological warfare attack.

Question 18b: Do you favor legislation to implement Article 4 of the 1972 Biological Weapons Convention, legislation which I have cosponsored?

Answer: The Executive Branch is working with the Congress on legislation to implement Article 4 of the BWC.

Question 19: Do you believe that the "biotechnological gap" between the United States and the Soviet Union is narrowing? On what information do you base your conclusions?

Answer: Yes. Multiple sources of information support the conclusion that the "biotechnological gap" between the U.S. and U.S.S.R. is narrowing. Intelligence studies are consistent with this conclusion, and exchanges of scientists and information sponsored by organizations such as the National Academy of Sciences also lead to the same conclusion. Many medical and scientific organizations, for example, the London-based scientific journal NATURE, sponsor exchanges of scientific information between western and Soviet scientists. Such exchanges cannot help but narrow the "biotechnology gap." See the classified addendum for additional information.

Question 20: [COL Huxsoll] You have stated that there are exciting new breakthroughs in the development of polyvalent live vaccines that will protect U.S. troops from a variety of pathogenic agents. Please document the breakthroughs to which you were referring.

Answer: Vaccinia virus, which is the virus used as the smallpox vaccine, can be used as a vehicle for genes that code protective proteins from other viruses and from toxins. To date, we have had success in experimental systems using vaccinia virus to express protective genes for Hantaan virus (which causes Korean hemorrhagic fever), Rift Valley fever virus (which causes Rift Valley fever), and for the protective antigen protein from anthrax. The size of the genetic material in the vaccinia virus is such that it should be possible to insert more than one protective protein gene into the virus, thus making a polyvalent, live vaccine.

Question 21: [COL Huxsoll] Your testimony indicates that the BDRP is aligned to respond to the threat and intelligence information defined by the intelligence community. Yet, according to a report by the Army Science Board Ad Hoc Subgroup on the U.S. BDRP in July 1987, an adequate definition of the BW threat, including the assessment of vulnerability of U.S. Armed Forces and civilian populations of the U.S. and its allies, did not exist at the time. To what was the BDRP responding as its budget grew sixfold from 1981 to 1986? If the BW threat assessment includes, or should include, civilian populations according to the Army Science Board, who is working to protect civilian populations?

Answer: During the period of budget growth, from 1981 to 1986, the BDRP responded to information provided by the intelligence community. Such information had not necessarily been formalized as threat. Because of the time frame required to produce "finished intelligence", the BDRP must in many cases consider less formalized information in program planning. The historical background of the budget increase is that prior to 1983, there was no support for product development - funding was sufficient only to sustain basic research and technology (the "6.1 and 6.2" programs). Exploratory development (6.3A) funding was authorized in 1983, and full scale development (6.3B and 6.4) was initiated in 1984. Since 1980, the Biological Defense Research Program has matured from a sustaining technology watch to a responsive program providing effective constraint, deterrence and protection against biological warfare agents.

The BDRP is a military program designed and focused to protect military personnel. It is not designed nor intended to provide protection to the civilian population. The U.S. Department of Health and Human Services, through the Centers for Disease Control, has the responsibility for medical protection of the civilian population. The Army and the BDRP cooperate closely with the CDC, and routinely share products such as investigational vaccines. See the classified addendum for additional information.

Question 22: How do you think the five most recent BW possessor nations acquired their offensive capability? Did they buy and sell knowledge and technology, or is their new capability homegrown?

Answer: See answer in classified addendum.

Question 23: How much of a deterrent is our vaccine program or any country's vaccine program, given the long lead time needed to immunize a population against an infectious agent, the time required to isolate and diagnose a novel infectious agent, and the wide variety of agents against which soldiers must be vaccinated?

Answer: We believe that the development of strong medical defensive measures serves to deter and constrain an adversary from using biological weapons. For example, if the U.S. makes it clear that we can protect troops, quickly identify and diagnose a disease caused by use of a biological weapon, treat casualties, and implement protective measures, most adversaries would be discouraged from using such weapons against U.S. Forces. They would have little military advantage to gain under such circumstances.

The length of time required to achieve immunity depends on the characteristics of a particular vaccine. Live, attenuated vaccines elicit immunity more quickly than do killed, inactivated vaccines. In a contingency scenario, moreover, even partial protection would be preferable to no protection. Thus, even the less than "perfect" vaccines currently available are thought to provide a deterrent to the use of weapons containing the corresponding disease agents. A primary goal of the BDRP vaccine program is to develop vaccines that are effective quickly and, ideally, after only one immunization.

The time required to isolate and diagnose a "novel" infectious agent is impossible to predict. However, the rationale for the maintenance of a strong basic research component of the BDRP is that such a "tech base" allows for the broadest possible capability in avoiding just such a technological surprise. The value of the BDRP as a deterrent lies in the basic research and exploratory development portions of the program as well as in vaccine development.

While vaccine development is a very visible component of the BDRP, efforts to provide the widest possible protection to U.S. Forces also include the development of broad spectrum antiviral drugs and immunomodulators. Some of these are being developed for prophylactic rather than therapeutic use. Vaccines are viewed as a necessary, but not sufficient, part of the medical protection effort. Again, the element of deterrence lies not in one or several individual vaccine products, but in the program as a whole.

May 17, 1989

Testimony of Keith R. Yamamoto, Ph.D. at a Joint Hearing of the Senate Committee on Governmental Affairs and Its Permanent Subcommittee on Investigations, on the Proliferation of Biological Weapons and the New Genetics

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This testimony is divided into three parts:

1. A consideration of biological warfare (BW) agents in the context of the new genetic technologies (here generically denoted "biotechnology").

2. A view of the goals and activities of DOD in this arena, of the efficacy of the Biological Defense Research Program (BDRP), and of the additional consequences of those activities.

3. A summary of goals and funding mechanisms of the National Institutes of Health (NIH) as they pertain to proposed modifications in the administration of BDRP.

BW and Biotechnology

BW agents are fundamentally different from conventional or nuclear weapons. First, the weapons themselves are living organisms, and therefore have at least limited capacity for self-proliferation. Second, BW agents act by blocking or co-opting specific normal biological functions; that is, they generate disease states within their victims. These unique properties make BW agents seem especially ominous and frightful. The same properties, however, make BW agents inherently less useful. For example, they are difficult to target and to restrict to enemy populations, and they are slow to act. Reflecting in part these substantial disadvantages, President Richard Nixon ordered the destruction of the U.S. biological weapons stockpiles in 1969, imposing a moratorium on research, production, possession and use of BW agents. "Biological weapons", he said, "have massive, unpredictable and potentially uncontrollable consequences. They may produce global epidemics and impair the health of future generations." A U.S. disarmament negotiator added that "few, if any, military situations can be imagined in which a state would try to redress a military imbalance by retaliating with weapons whose effects do not show up for days." President Nixon's actions anticipated the signing of the 1972 Biological and Toxin Weapons Convention.

Beginning in the late 1970's, a strong resurgence of BW-related research activities emerged under DOD sponsorship. According to DOD, this renewed interest was stimulated by concern over U.S.S.R. efforts to maintain an offensive BW capability, together with the "realization that new methods in molecular biology and genetic engineering potentially can be applied to the creation of novel BW agents". [1] Under President Reagan, funding for these studies increased to the point that DOD is now second only to the National Institutes of Health (NIH) in federal support for biotechnology, ahead of ten other federal agencies that fund this research, including the National Science Foundation, the Department of Agriculture, and the Department of Energy.[2] A 1986 U.S. Army report asserted that "perhaps the most significant event in the history of biological weapons development has been the advent of biotechnology." Douglas J. Feith, a Deputy Assistant Secretary of Defense in 1986, suggested that "it is now possible to synthesize BW agents to military specifications. The technology that makes possible so-called designer drugs also makes possible designer BW."

What is the impact of the new genetic technologies upon the overall BW "equation"? First, biotechnology provides, in principal, the means to produce virtually an infinite array of BW agents. Minute changes in the outer surface of a pathogenic virus, for example, could render existing vaccines useless. In this sense, each minute change would produce an entirely distinct weapon. Second, the capacity to transfer toxin or disease-causing genes from their normal sites (often exotic and poorly characterized organisms) into rapidly-dividing and well-studied bacterial strains would greatly simplify, in principle, storage and large-scale production of potential BW agents. Thus, while it would not at all be a simple matter to "synthesize BW agents to military specifications", the tools of biotechnology could certainly be applied toward such ends. In this context, it is significant that the U.S. scientific establishment is, by a substantial margin, pre eminent in biotechnology. Thanks largely to NIH support, U.S. scientists in the early 1970's were first to develop recombinant DNA techniques, and they have continue to be the prime innovators and practitioners of this technology. This leadership role has broad implications not only for potential applications of biotechnology to BW research, but also for consideration of the U.S. position in a "BW research race", and for perceptions of U.S. BW activities from abroad. Finally, it is particularly important to emphasize that biotechnology has had absolutely no effect on the inherent weaknesses of BW agents as efficacious weapons: they remain difficult to target, difficult to control and slow to act. In this sense, biotechnology has had no impact on BW technology.

DOD (BDRP) Activities and Consequences

The stated mission of the BDRP is "develop measures for detection, treatment, protection and decontamination of potential biological warfare threat agents. Development of medical defensive measures, such as prophylactic vaccines and drugs, therapeutic measures, and patient treatment and management protocols are important components of the program." [1] The program is conducted jointly by the U.S. Army Medical Research and Development Command (USAMRDC), the Chemical Research, Development and Engineering Center (CRDEC), and the Dugway Proving Ground (DPG). In particular, the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), a component of USAMRDC, pursues the "pathogenesis, diagnosis, prophylaxis, treatment and epidemiology of infectious diseases and toxins that pose potential BW threats or are disease hazards endemic in various regions of the world." [1] That research also contributes to our understanding of the mechanism and treatment of disease. The predominant focus of the program for "Medical Defense Against BW" is the production of vaccines that neutralize a specific agent, a range of related agents, or several genetic variants of a single agent.

The development of vaccines against toxins or pathogens endemic to regions occupied by U.S. troops seems clearly justified. However, practical and conceptual considerations indicate that this strategy cannot succeed as a broad defense against BW, especially in the age of biotechnology. That is, the potential for recombinant DNA methodology to be used for production of an endless array of novel BW agents renders any vaccine program, in the long run, futile. Even with the naturally occuring pathogenic agents, no conceivable vaccination scheme could fully protect the armed forces, much less the general public. It is important to emphasize that vaccines act specifically against only one or a few agents, and that they generate their protective effects slowly, over a period of weeks or months after administration; they are useless if given after the fact. Nevertheless, DOD programs call for the production and testing of actual BW agents, and for the production and stockpiling of millions of doses of vaccines. Who would receive which vaccines? How and when would they be administered? Enemy forces, of course, could in principle deploy multiple agents serially or simultaneously. Remarkably, according to USAMRIID Commander, Colonel David Huxsoll, a definitive policy has not yet been developed on the use of the vaccines.[3]

One must conclude that this BDRP strategy is unlikely to protect even military personnel against a deliberate attack by BW agents, especially novel genetically-engineered variants. In turn, this raises questions about the overall justification for the program, and concerns about certain related negative consequences. I shall mention briefly three issues that arise with BDRP as it is presently structured: (1) it destabilizes arms control efforts by raising suspicions, by compelling other nations to develop similar programs, and by subverting the distinction between "offensive" and "defensive" research; (2) it exacerbates public health concerns by expanding the scope and scale of development, testing and risk assessment programs using BW agents; (3) it squanders fiscal and intellectual resources by supporting studies of questionable scientific significance.

First, consider destabilization of arms control. To produce vaccines against variant pathogenic agents, the variant agents themselves must first be produced. Such manipulations seem to violate the spirit if not the word of the 1972 Biological Weapons Convention. Colonel Huxsoll and others have stated emphatically that research of this type is not carried out at USAMRIID or elsewhere within BDRP. However, in an analysis of 329 Obligation Reports and Technical Work Unit Summaries (Form 1498) obtained from DOD through the Freedom of Information Act, Charles Piller and I uncovered (and documented in "Gene Wars") numerous projects that involve manipulation of antigenicity and pathogenicity of biological agents. Indeed, one study stated simply that its "goal is to modify enteric bacteria genetically to produce any desired antigenic structure and level of pathogenicity", noting that "such strains can serve as vaccine strains".[4] Another study modified the botulism neurotoxin such that toxicity was conserved while antigenicity was destroyed, thus yielding a form of botulism that would be unaffected by a conventional vaccine.[5]

Other projects concerned development of delivery systems that seemed inconsistent with the distinction between offensive and defensive research mandated by the 1972 Weapons Convention. For example, one report noted that "a new generation of nose-only aerosol exposure system was made operational. For the first time, T-2 mycotoxin was successfully disseminated. The aerosol contained sufficient toxin to kill mice."[6] How should potential adversaries, or allies for that matter, view these and other reports? Given the intrinsic flaws of the vaccine strategy, how can we allay fears and suspicions about "actual motives" that may underlie these programs. Especially because the United States is the acknowledged world leader in biotechnology and biomedical research, the BDRP strategy is destabilizing to arms control efforts. Indeed, it virtually demands that other nations, large and small, develop parallel programs.

The second problem concerns public health, and the problematic history of DOD BW testing programs. For example, the 1950's release of biological agents over San Francisco Bay and into the New York subway system were finally acknowledged and documented in 1977. The DOD now seeks to refit Dugway Proving Ground for extensive aerosol and pathogen testing, with the stated goal of developing new detection and protection systems. Employing actual pathogens for these purposes, however, seems a questionable strategy; "simulant agents", non-pathogenic look-alikes, would be completely safe and would likely provide even more sensitive tests than the actual agents. The expanded efforts of the DOD to employ actual pathogens increase the probability of error or of recklessness, which in turn could have unfortunate or even disastrous public health consequences.

The third problem regards utilization of fiscal and intellectual resources. DOD research is carried out almost exclusively under contracts in which researchers are invited to submit proposals to satisfy narrowly defined programmatic goals. DOD contracts for BDRP research currently support studies within primary DOD installations, and at nearly 100 extramural sites, including universities, research institutes and private companies.[1] What is the quality of such research? In general, targeted research programs tend to discourage participation from the most innovative researchers. In turn, the availability of such contract funds may affect the research priorities of other investigators; one researcher, conducting experiments on anthrax antigenicity, noted that "I wouldn't be in this field if I hadn't gotten money from the Army".[2] Moreover, the scientific review of those applications is advisory only (the DOD can and does fund projects that receive negative scientific evaluations if the projects are of sufficient military importance), and many of the reviewers themselves appear poorly qualified. For example, a panel of 11 scientists charged with judging molecular biology proposals for the biological sciences division of the Army Research Office in 1987 included only a single molecular biologist.[8]

A significant fraction of the 329 project summaries examined described work that seemed conceptually weak, of questionable significance, or extravagantly supported. One study, for example, sought "biotechnological enhancement of human capabilities to complement and exploit technological advances in information processing and in weapons systems" by identifying "critical factors in peak performance by military and athletes."[9] In addition, the results from some of the most well-funded programs were virtually absent from the scientific literature. Even at USAMRIID, the Primary Research Site for the Medical Defense Program, productivity (as assessed by funding level relative to published findings) is modest. For example, in FY 1987, USAMRIID received $19.8 million to support seven large research projects (divided into 33 subprojects). Three of the large projects received $8.2 million and resulted in 28 publications; 11 of the 33 subprojects, supported by $2.6 million, yielded no publications.[10] For comparison, researchers in my Department at the University of California, San Francisco received about $7 million in federal support (mostly from NIH) during that same period, and published 165 papers. More important than these raw numbers, of course, is the quality of the research. A major concern is that the funding policies of BDRP support studies that fall substantially short of top-quality.

Proposed Changes

The broad objectives of BDRP are, according to DOD, essential for maintaining the security of U.S. armed forces. Moreover, many of the diseases and infectious agents investigated within BDRP are major scourges, especially in underdeveloped nations, that have claimed millions of lives. Thus, despite the practical and conceptual flaws in the vaccine strategy, and the issues of arms control destabilization, public health concerns, and utilization of resources and quality control, the overall goals of BDRP are not without merit. How might those objectives better be achieved? Here it is useful to consider the research supported by the National Institutes of Health, a consortium of 12 Research Institutes that together investigate "the causes, diagnosis, prevention, treatment, and rehabilitation of human diseases and disabilities".[11] Clearly, this mission overlaps substantially with those of BDRP and USAMRIID. Indeed, the mission statements of two of the NIH Research Institutes coincide even more explicitly with BDRP and USAMRIID: the National Institute of Allergy and Infectious Diseases (NIAID) "conducts and supports research to study the causes of allergic, immunologic, and infectious diseases, and to develop better means of preventing, diagnosing, and treating illness"; the National Institute of Environmental Health Sciences (NIEHS) "investigates the effects of chemical, physical, and biological agents on human health".[12]

NIH funding programs have produced the most broad-ranging, creative and dynamic biomedical research enterprise in the world. Since 1950, the Nobel Prize in Physiology or Medicine has been won or shared by 52 scientists holding NIH support, a remarkable record of dominance. NIH-funded research has cured disease, developed new drugs and patient treatment methodologies, and generated the observations and innovations that spawned the biotechnology industry. What is responsible for such a consistent pattern of success? In part, it reflects an "open" grant system, in which individual investigators initiate their proposals, rather than respond to contract offerings. This encourages freedom of inquiry, and novel interpretations of unexpected results. Such an uninhibited "discovery" mode is one of the most exciting and important driving forces for rapid progress in biological research. Equally important to the success of NIH programs has been the rigorous review process used to evaluate NIH grant applications. Every grant is subject to two levels of review. An Initial Review Group (Study Section) composed of 15-20 eminent scientists in a given subject area, first evaluates the application solely on the basis of scientific merit. The Study Section assigns a numerical priority, and passes its findings to a National Advisory Council representing a particular NIH Research Institute. Councils are comprised of 15-20 individuals, scientists as well as lay representatives with a demonstrated interest in the program areas of the Institute. The Council makes funding recommendations based on considerations of scientific merit as well as on relevance of the proposed studies to the programmatic goals of the Institute.

Why should the U.S. support two research funding enterprises with such similar overall objectives? Is it appropriate that DOD is the second largest funding agency for U.S. biotechnology studies? The NIH has clearly devised an outstanding mechanism for stimulating and supporting outstanding biomedical research. It is also relatively free of the other potential problems inherent in BDRP, such as destabilization of arms control, or credibility issues concerning the protection of public health. In short, BDRP could carry out studies of higher overall quality, accomplishing the same goals without the inherent complications, if the funding and review processes were administered by NIH. According to such a plan, funds for "Medical Defense" and related portions of BDRP would be transferred into the NIH budget (e.g., into NIAID and NIEHS), thereby becoming subject to its review and oversight policies; a bill with these provisions is being introduced by Rep. Wayne Owens (Utah). The dual review system at NIH offers the opportunity to assess projects for scientific merit alone, and to make subsequent policy decisions concerning programmatic and scientific areas to be supported. This would ensure that the goals of

BDRP would be considered and accommodated; in fact, the Assistant Secretary of Defense for Health Affairs is already chartered as an ex officio member of the NIAID and NIEHS Councils.

Notably, certain funds transferred from appropriate BDRP programs into NIH could explicitly be targeted to the investigation of the same viruses, parasites and other pathogens presently studied in BDRP. Efforts to develop vaccines against naturally occuring agents would be continued, and an expanded emphasis might be placed upon understanding the basic mechanisms of infectivity and pathogenicity by these agents. High quality research, pursued vigorously and intelligently, and reported openly, could therefore reap enormous public health benefits, especially within the third world. At the same time, the broad dissemination of this information would undermine the utility of those agents for BW purposes. If these actions could be coupled with increased diligence and vigilance in strengthening present sanctions against biological weapons, citizens of the world might be safer and healthier, and perhaps a bit more optimistic in the struggle to reduce the tensions and threats that we place upon each other and upon our planet.

Footnotes

1. Final Programmatic Environmental Impact Statement, BDRP, April 1989.

2. Congressional Office of Technology Assessment, July 1988.

3. Quoted in "Gene Wars", (C. Piller and K.R. Yamamoto; Beech Tree/William Morrow, New York, 1988), page 122.

4. Form 1498, Walter Reed Army Institute of Research, Project 3M161102BS10, Agency Accession No. DA OA 6436.

5. Form 1498, University of Wisconsin, Project 3M162770A871, Agency Accession No. DA OG 5087.

6. Annual Report on Chemical Warfare - Biological Defense Research Program Obligations DD-USDRE (A) 1065, FY 1988, page 48.

7. Quoted in "Gene Wars", page 159.

8. "Gene Wars", page 216.

9. Form 1498, DA ARI Presidio of Monterey Field Unit, Project 2T161101A91B, Agency Accession No. DA 307000.

10. USAMRIID Annual Report, Fiscal Year 1987; Projects 3M161102BS12, 3M263763D807, 3S464758D847.

11. From "NIH Extramural Programs" (NIH Publication 88-33).

12. From "1988 NIH Almanac" (NIH Publication 88-5).

PREPARED STATEMENT

TESTIMONY OF MATTHEW MESELSON
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BEFORE THE COMMITTEE ON GOVERNMENTAL AFFAIRS
US SENATE
MAY 17, 1989

I appreciate the opportunity to appear before this Committee to take part in its continuing consideration of biological and toxin weapons. In addressing the questions you have posed for today's hearing, I believe it is important to understand the reasoning that went into the long-standing US renunciation of these weapons.

Twenty years ago, after intensive interagency review, the United States unilaterally and unconditionally renounced the development and possession of biological and toxin weapons. Our considerable stockpiles of such weapons were destroyed and the facilities for developing and producing them were converted to other uses.

These US decisions went far beyond the mere cancelation of a program. They renounced, without prior conditions, even the option to develop or acquire biological and toxin weapons. Why?

First, it was understood that biological weapons could be as great a threat to large populations as nuclear weapons and that no reliable defense is likely. Already having nuclear weapons, the US has no need for an additional, less predictable, less targetable strategic system ineffective against hardened military installations.

Second, it was evident that biological weapons could be much simpler and less expensive than nuclear weapons to develop and produce. Proliferation of biological weapons would greatly increase the number of nations to which the populations of the United States and its allies are hostage.

Third, it was realized that our biological weapons program was pioneering an easily duplicated technology and that our program was likely to inspire others to follow suit.

This stark analysis led to the conclusion that our biological weapons program was a substantial threat to our own security. The policy implication was that we should convincingly renounce biological weapons and seek to strengthen international barriers to their proliferation. In implementing this overall policy, the US sponsored the Biological and Toxin Weapons Convention of 1972, ratified it in 1975 and led efforts to enhance the limited verification provisions of the Convention at its Second Review Conference in 1987.

Today, to the best of my knowledge, no nation possesses a stockpile of biological or toxin weapons. Nevertheless, there is justifiable concern that the recent proliferation and use of chemical weapons, particularly in the Middle East, may set the stage for attempts to develop and produce biological weapons.

The potential linkage between chemical and biological weapons is one of the factors that argues for pressing forward with our commitment to achieve a verifiable international ban on chemical weapons. This treaty, the Chemical Weapons Convention, is now in an advanced phase of negotiation by the 40-nation Committee on Disarmament in Geneva. The present "rolling text" of the Convention is largely based on the US Draft Treaty presented in Geneva in 1984 by then Vice-President Bush. At the time, the Soviets and even some of our allies were unwilling to accept the tough verification measures called for in the US Draft. But with the changing attitude of the Soviet Union toward on-site verification, the US position won out. It is time to give high priority to settling the remaining issues at Geneva, to resolve outstanding bilateral issues with the USSR and to conduct needed studies in the US on verification techniques.

Our first and most important line of defence against biological and toxin weapons is the effort to prevent their introduction into the arsenals of the world. We do this through our own example, through a growing and increasingly intrusive system of arms-control agreements, and by a variety of diplomatic activities backed up by the influence and prestige of the US.

In addition to these efforts to prevent the proliferation of biological and toxin weapons, there is the possibility of providing a limited defence against them. President Nixon in 1969 did not reject biological research for protective purposes. Instead, he announced that "We shall restrict our biological program to research for defensive purposes, strictly defined--such as techniques of immunization, safety measures and the control and prevention of the spread of disease."

This careful statement remains a good definition to guide US military biological research programs. It subordinates biological research to the fundamental US policy of renouncing biological weapons and building constraints against their proliferation. Moreover, it recognizes the requirement that our renunciation be convincing to others.

I recall that shortly after President Nixon's decisions, the White House sent inquiries to a considerable number of scientists and others who had been involved in the US biological weapons program. The inquiry asked if the US biological research program could be conducted without secrecy. The great majority of respondents replied that secrecy was not needed.

Openness in all biological research has advantages that far outweigh any risk. It makes US policy credible. It helps in recruiting and keeping the most talented investigators and in exposing shoddy work or misguided lines of research. Openness accelerates progress through the kind of scientific interchange characteristic of the health sciences. Finally, by minimizing mutual suspicions, openness makes it possible for more nations to coordinate their efforts to combat disease and to guard against infringements of the prohibition of biological and toxin weapons.

I believe that there are areas of biological research in which the military should be engaged. These must be judged on a case-by-case basis. Military research should be done with the same high degree of openness that characterizes other research in medicine and public health. There should be meaningful civilian involvement in the oversight of the entire program, although it must also be recognized that the military have special needs for protection against hazards that the civilian sector tends to ignore. Organized and directed properly, USAMRIID and similar military facilities can increasingly be used to enhance confidence in biological disarmament and to help overcome the very real threat to the military and to all mankind from naturally occurring disease.

I would welcome your questions.

APPENDIX--SOME TECHNICAL CONSIDERATIONS

A. Biological and toxin weapons.

Biological weapons based on the use of known infectious agents pathogenic to man, such as certain bacteria and viruses, could provide a capability to kill or incapacitate populations over large areas. Delivered by aircraft, missile or other means and dispersed near the ground as wind-borne aerosols to be inhaled by a target population, such agents could be at least as effective, in terms of the weight required to attack a given area, as nuclear warheads. Examples of infectious agents stockpiled as weapons by the US before President Nixon unilaterally and unconditionally renounced biological weapons in 1969 are the bacterium Pasteurella turarensis, responsible for tularemia, and the virus that causes Venezuelan equine encephalitis.

Contrary to popular misconception, the initial development and production of reliable strategic weapons based on infectious agents would require large technical resources and expenditures for development, testing and production, both of the agent itself and of the associated equipment for dissemination. Nevertheless, rudimentary but dangerous microbial weapons of lower reliability could be produced with correspondingly less effort and expense and are within the reach of many nations and even of dissident groups.

Once developed, biological weapons could be reproduced much more easily than nuclear weapons. This is because the underlying technology is intrinsically much simpler, cheaper and readily available.

Toxins, unlike infectious agents, are not capable of reproduction. They are defined as poisonous substances made by living organisms. While infectious agents generally require incubation periods of a few days following exposure before illness develops, some toxins can cause incapacitation or death within minutes or hours. Examples of toxins that have been considered for use in weapons are the botulinal toxins, produced by the soil bacterium Clostridium botulinum, and ricin, present in castor beans, the seeds of Ricinus communis. A few toxins have also been made artificially, by chemical synthesis. Although toxins are generally more difficult and costly to produce than infectious micro-organisms, they can be faster acting. With sufficient effort, it may be possible to develop effective anti-personnel weapons for large-area coverage with aerosols of certain toxins.

For purposes of comparison, the approximate amounts of certain bacterial, toxin and chemical agents sufficient to attack a 100 square kilometer target area are listed in the table below. The weight of delivery vehicles and of munitions or other devices for disseminating the biological, toxin and chemical agents is not included. The table also gives the approximate weight of a 1 megaton thermonuclear warhead, for which the area of high casualty production would be about 100 square kilometers.

WEIGHT REQUIREMENTS FOR VARIOUS WEAPON TYPES*

Weapon Type	Illustrative Agent	Weight of Agent To Attack 100 Square Kilometer Target (pounds)
Biological	P. tularensis	less than 10
Toxin	botulinal toxin	approximately 10 (assumes toxin can be stabilized)
Thermonuclear		approximately 1000 (warhead weight)
Chemical	nerve agent (sarin)	approximately 50,000

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* Based on estimates in Health Consequences of Biological Warfare, World Health Organization, Geneva, 1970.

B) Protection against biological and toxin weapons. On condition that the particular threat agent is identified sufficiently far in advance of exposure, it may be possible to provide protection by immunization. This requires adequate supplies of the necessary vaccine or anti-serum and sufficient time for administration and, for vaccines, the development of immunity in the treated population. For many infectious agents and toxins, however, no effective vaccines or anti-sera have been developed and, in some cases, even persistent development efforts have remained unsuccessful.

For some but by no means all potential agents, antibiotics or other drugs can be effective, either as prophylaxis or as therapy. A great deficiency in this approach, however, lies in the unfortunate fact that there is as yet no curative treatment for even one of the many systemic human viral diseases.

The only generally effective protection against all airborne biological agents and toxins is air filtration. Given warning or suspecting an attack, military personnel can rapidly be protected to a high degree against biological and toxin weapons with standard-issue military gas masks, collective shelters and vehicles with filtered air. Such equipment is already widely deployed by modern armed forces for protection against chemical warfare agents. There is as yet, however, no reliable generic detection system for airborne biological and toxin agents. Of course, if a sufficient degree of threat is thought to exist during a particular mission, military units could be placed in protective posture for the duration of that mission.

The protection of large civilian populations would be a far more difficult task. It would require the development and provision of reliable alarm systems, the issuance of gas masks, the construction of neighborhood and workplace shelters, the conduct of regular education and drill in protective procedures for the entire population, and massive preparations for medical diagnosis and care. Such a defence would be immensely expensive and stressful to create and maintain. Of course, there is clearly merit in having fast-response epidemiological teams and limited emergency supplies of certain vaccines, antibiotics and other supplies in order to cope with natural threats to public health. Nevertheless, although such preparations may be able to cope with certain acts of sabotage, adequate protection of the civil population against a determined large-scale biological or toxin attack is in general not feasible.

TESTIMONY PREPARED FOR THE UNITED STATES SENATE
COMMITTEE ON GOVERNMENTAL AFFAIRS

May 12, 1989

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Mr. Chairman, Members of the Committee and Staff:

My name is Jonathan King. I reside in Boston, Massachussetts and am employed as a Professor of Molecular Biology at the Massachussetts Institute of Technology in Cambridge Mass, where I teach and do research on the genes and proteins of a group of viruses that infect bacteria. I am pleased to be given this opportunity to speak to you today.

I currently chair the Committee on the Military Use of Biomedical Research of the Council of Responsible Genetics. The CRG is a national organization of scientists, environmentalists public officals and citizens working to insure the productive development of biotechnology in a socially responsible manner. The Committee on the Military Use of Biomedical Research has been closely monitoring developments related to the Biological Weapons Convention and biological weapons issues for the last five years.

I will begin by addressing the national security imnplications of the BDRP. Living organisms are qualitatively different from gunpowder, mustard gas and nuclear bombs. These agents, dangerous as they may be, do not grow and reproduce themselves. As a results of this fundamental feature of living creatures, they always have the potential to spread through populations and ecosystems, a feature of virus infections so tragically familiar to us at present. As a result, though always a hazard to human populations, they have never been effective weapons, agents whose targets chould be tightly controlled. It is particularly important to recognize that infectious agents recognize neither national boundaries nor uniforms, whether the black plague in the 14th centurty or AIDS in the 20th century.

It is not at all clear that it will be possible using biotechnology to generate infectious agents that have the character of weapons: agents that will in a controlled manner cause damage to enemies and not to friends. However, I have no doubt that research efforts in this area will generate as side products organisms deleterious to the health and welfare of human plant and animal populations.

The danger to is not the development of biological weapons; it is the proliferation of biological weapns defense programs thesmelves.

THE OVERLAP BETWEEN DEFENSIVE AND OFFENSIVE BW R&D.

The self reproducing character of living organisms, and the ever present potential for spread through a population, requires that any plan for offensive use begin with the ability to defend ones own troops or population.

Consider the development of a vaccine against a virus. Historically vaccines were made from inactivated viruses, so that preparation of the vaccines required growth of the virus in substantial quantities. With advances in biotechnoogy it is in many - though not all cases - possible to develop vaccines using only parts of the virus. However, sooner or later the vaccine must be tested. This means infecting animals or humans with the actual virulent form of the agent that you believe will be deployed. Thus intrinsic to any program is the gathering of data on the infectious properties of the weapon agent; the dosage required; the time course of the infection; its severity or degree of debilitation. Without such information it is impossible to evaluate the efficacy of the vaccine and carry out the primary mission.

Therefore no matter how vigorously one proclaims or believes in the defensive intent an informed observer knows that the data and technical capacity needed for the offensive side is always present..

Similarly consider an aerosol test facility. To determine whether some inactivation process is effective, one generates actual aerosols to mimic a projected military scenario. As a result of this the technoogy for generating aerosols is of course developed. The work with the aerosols then yields critical data; how long does the agent survive, what size droplets are optimal, what processes are they resistant or sensitive to. Again, a neutral informed observer will recognize immediately the potential offensive value of such pilot work.

This inablity to separate offensive from defensive capacity is an intrinsic aspect of BW R&D. It is not a flaw in the program, but follows inexorably from the fact that organisms are self-reproducing and qualitatively different from other materials. No reorganization of the program can eliminate this problem.

CONTINUATION OF THE BDRP PROGRAM WILL SPUR THE PROLIFERATION OF SUCH PROGRAMS IN OTHER NATIONS

Because of the ambiguous charaacter of BDRP programs, they are provocative with respect to other nations, and destablizing with respect to the treaty regime. I'm sure the Dept. of Defense would not look favorably on the establishment of aerosol test facilities in Cuba, Nicuaragua, Angola or the Soviet Union. The direct consequence of this can only be proliferation of such efforts by other nations around the globe.

However, even without this bimodality the impetus for proliferation is equally great. After all if these are really only defensive programs, and potentially efficacious against threat, why shouldn't other nations have them. Why shouldn't Pakistan and India have BDRP prgrams? Or Syria and Israel, Iran and Iraq, Greece and Germany, Honduras and Nicuaragua, or East Germany and West Germany?

Consider the consequences. In each case the mission will be to try to figure out beforehand what sort of novel pathogens the adversary may want to develop. Then to establish research programs on generating such novel pathogens so as to be able to prepare defenses.

The worldwide proliferation of such research effects will almost certainly yield as products or side products the development of variant, novel, or prophylaxis-resistant pathogens of plants, animals or humans. We have enough problems trying to deal with the scourges such as AIDS without catalyzing the growth around the world of investments designed to generate novel pathogens. Such a development would be a human tragedy of historic proportions.

THE QUESTION OF TERRORISM

The scale of equipment, materials and facilities required to carry out a full scale research program on infectious agents is far smaller than that required for example for ballistic missile development. Nonetheless, given the complexities of living organisms and the current state of knowledge, a program whose goal was to develop biological warfare agents is a major research project. Such agents would have many stringent requirements in terms of infectivity, survivability, transmissability, storage properties, resistance to prophylaxis etc.

Such a program requires many many years of work by a relatively large group of highly trained scientists who would have to have access to modern technology in genetic engineering; instrumentation, enzymes, reagents, high powered computers, animal facilities,etc. A large library is required with continued access to current scientific journals.

In my estimation there is no possibility that such a program could be carried out by a terrorist grouping. If it was launched it could not be kept hidden. Of course, such programs certainly can be initatied by the governments of many nations, as suggested above.

The danger from terroists is not the development of biological weapons, but rather a raid on such a facility. Therefore protection from terrorism again lies in the direction of strengthening the treaty and prohibiting the establishment of biological research for military purposes.

INHERENT HEALTH AND ENVIORNMENTAL RISK OF BW PROGRAMS

The development of 'defensive' biological weapon programmes constitutes a substantial environmental and health risk to the nation conducting the research. As noted above, such programmes generally require growing and testing agents thought to be related to potential BW agents. Many of these will be pathogens or relatives of them. Even in the absence of an accident, it will be extremely difficult to develop and test the effects of such agents on organisms without substantial risk of their escape into the ecosystem.

Once a pathogen has entered the ecosystem, it may persist for long periods of time, causing significant disruption to the economy and/or public health of the area. For example, Bacillus anthracis, the bacterium responsible for anthrax, appears to be capable of establishing itself in a wide range of climates. This could lead to the creation of new and permanent reservoirs of the disease. A pathogen that has escaped into the environment has the potential to disperse by natural forces such as by wind, water or insect vectors. The survival and dispersal properties of such micro-organisms are difficult to predict or control.

INCREASING NATIONAL SECURITY

A number of measures have been introduced recently into Congress that are steps in the right direction: The CRG supports

- Implementing article IV of the Biological Weapons Convention to move its terms into domestic law through passage of HR237. At the present time there are no criminal penalties available should private individuals, corporations or institutions violate the terms of the treeaty.

- Passage of HR806, the Biological Defense Safety Bill, which would require public listing of all agents used in the Biological Defense Program. This is an important public health measure.

Where does National Security lie in the long run: The CRG believes that we should follow the path begun by President NIxon when he unilaterally terminated the US BW program. This paved the wave for the Biological Weapons Convention, the strongest multilateral disarmament treaty in modern history. The next step for U.S. policy is clearly to

1.Terminate the BDRP and the Dugway test progam. Transfer the funding for medically or technically useful aspect of the programs to civilán agencies to carry foward the scientifically useful aspects of the project.

2. Launch a Diplomatic Offensive publicizing the Biological Weapons Convention domestically and internationally. One rarely hears of this treaty from our own government agencies. The current issue of Biotechnology magazine with broad circulation carries a DOD sponsored report discussing military applications of biotechnology which makes no mention of the existence of such a treaty.

a) Send Arms Control and Disarmament Agency personnel to International Scientific Meetings to present the US position and describe the Treaty.

b) Take advantage of the upcoming 1991 review of the BWC to strengthen it and to institute the levels of verification provisions required. Though a biolgoical weapons program is not as obvious as a missile testing facility, it requires too many faciliites and factors to be easily concealed.

c) Develop a policy of Economic and Political Sanctions against any nation or group found to be violating the treaty.

Every dollar spent on promoting and strenghtening the treaty and on a dipomatic offensive for the peaceful use of biotechnology will buy orders of magnitude more National Security than dollars spent on the BDRP program.

Our nation has been the world leader in the historic breakthrough in genetic engineering and biotechnology. We are now seeing the onset of a dangerous and tragic turn toward millitarizing this technology. We should turn away and become the world leader in its peaceful development. The Congrces can take the lead in this initiative.

Thank you for the opportunity of addressing you.

PROLIFERATION OF BIOLOGICAL WEAPONS

Testimony by

Victor W. Sidel, MD

Presented to the

United States Senate

Committee on Governmental Affairs

and its Permanent Subcomittee on Investigations

May 17, 1989

My name is Victor W. Sidel. I am a physician with special training in internal medicine and public health. For identification, I am Distinguished University Professor of Social Medicine at Montefiore Medical Center/Albert Einstein College of Medicine in the Bronx, NY, past president of the American Public Health Association (APHA) and of the Physicians for Social Responsibility (PSR), and a member of the Board of Directors of PSR and of the Physicians for Human Rights (PHR). I am also the chair of the Working Group on Chemical and Biological Weapons sponsored by PSR and PHR.

Attempts to use biological weapons have a long history. In ancient Persia, Greece and Rome diseased corpses of men and animals were used to contaminate wells and other sources of drinking water. When the Mongols besieging the Black Sea port of Caffa began in 1347 to die of plague, the survivors catapulted the corpses into the city and the Genoese who were defending it also began to die of plague. The defenders fled, contributing to the spread of "the black death" to Italy and indeed all of Europe. On our own continent, during the French and Native American War, Lord Jeffrey Amherst, the commander of the British forces at Fort Pitt, is said to have given blankets containing scales from victims of smallpox to the Native Americans surrounding the fort causing, it is believed, a smallpox outbreak.

During the negotiations for the Geneva Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of all Analogous Liquids, Materials or Devices and of Bacteriological Methods of Warfare in 1925, the abhorrence of biological weapons was so great that "bacteriological methods" were added to what had originally been envisaged as only a chemical weapons treaty. The Protocol, to which over 100 nations are party, prohibits the use, but not the production or possession, of chemical and biological weapons in warfare. A number of nations reserve the right to respond in kind, so this is basically a "no first use" treaty.

When Japan attacked China in the 1930s it is alleged that rice and wheat grain were mixed with fleas carrying plague, resulting in plague in areas of China that had not had plague before. Other bacteria may have also been used as weapons by Japanese troops and there are reliable reports of extensive experimentation in a Japanese biological weapons laboratory in China on the effects of these weapons on prisoners of war from a number of different countries. According to testimony at the Nuremberg trials, prisoners at German concentration camps such as Buchenwald were infected in tests of biological weapons. During World War II it is alleged that Germany infected Romanian Cavalry horses with glanders. The British are known to have released anthrax spores on Gruinard Island off the coast of Scotland; it remained uninhabitable for many years. Churchill is said to have considered attacking German livestock with anthrax, but this was never carried out. In the U.S., work on anthrax and brucellosis as weapons was performed. There have also been reports of Soviet research on biological weapons during World War II.

Since World War II there have been numerous allegations of biological weapons development and even use by a number of nations including the United States. Most of these are unsubstantiated and some of them effectively refuted. These include: the allegation by the U.S. that the "yellow rain" seen in Laos and Cambodia was a biological weapon released by the Soviets and the Vietnamese; the allegation by Secretary of Defense Weinberger that an outbreak of anthrax in the Soviet city of Sverdlovsk was "evidence of inadvertent release of anthrax bacteria from a highly secured military installation"; allegations by China and by Cuba of the introduction of biological weapons into North Korea and Cuba by the U.S.; and the allegation by the U.S. that Iraq had been developing biological weapons agents.

But in some instances the facts are documented. For example, it was revealed in 1969 that in the 1950's and 1960's the University of Utah had under contract conducted secret experiments at the U.S. Army Dugway Proving Grounds involving large-scale field testing of some of the most infectious and toxic biological warfare agents including tularemia, rocky mountain spotted fever, plague and Q fever. This was also the site of the 1968 discharge of nerve gas which because of unexpected wind conditions killed thousands of livestock, a topic on which 20 years ago I testified before a Congressional committee. In 1950, U.S. Navy mine sweepers released aerosolized Serratia Marsescens in sufficient quantities to contaminate 117 square miles of the San Francisco area. This presumably harmless species, used as a simulant (a presumably non-pathogenic organism used as a stand-in for a pathogenic organism), proved later to be dangerous, particularly to immunologically-compromised individuals. During the 1950's and 1960's, the U.S. conducted 239 top-secret open-air disseminations of simulants involving such areas as the subways of New York City, the Kittatinny and Tuscarora tunnels on the Pennsylvania Turnpike, and Washington National Airport. So far as can be ascertained, there was no notification or attempt to gain approval for these tests from the people, the municipalities or the health authorities of the areas involved, not even to alert them to the potential danger if anything went wrong.

In 1969 the Nixon Administration announced that the U.S. would unilaterally dismantle its biological weapons program because such weapons were militarily useless, were no threat to the U.S. or its security, and were especially repugnant because of their anti-civilian nature and uncontrolability. In 1972 the Convention on the Prohibition of the Development, Prevention and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction was concluded. It was ratified by the U.S. in 1975 (the same year in which the Senate ratified the Geneva Protocol of 1925), and over 100 nations are party to it. The Convention prohibits (except for "prophylactic, protective and other peaceful purposes") the development, production, stockpiling, transfer or acquisition of biological agents or toxins, as well as weapons and means of delivery. As we shall see, the exception creates a large potential loophole in the Convention.

In recent years, perhaps because of the spectre of new biological weapons produced by genetic engineering techniques or because of allegations of aggressive biological weapons programs in other countries, the U.S. decision totally to dismantle its biological weapons program seems at least in part to have been reversed. Funding for the U.S. Army Biological Defense Research Program (BDRP) in the U.S. has quadrupled since 1981 ($15.1 mil in 1981; $60 mil in 1988) and the basic research component of BDRP activities, including research sponsored at universities or private laboratories, increased 60-fold from 1981 to 1986. Environmental impact statements for the U.S. Army aerosol testing facility at the Dugway Proving Ground, for which upgrading is sought, list agents for possible testing that are known to be the causes of the top four most frequently acquired laboratory infections; all require a very low number of microorganisms to infect their host. They include Coxiella Burnetti (Q fever), Venezuelan Equine Encephalitis, Francisella Tularensis (tularemia), and Bacillus Anthracis (anthrax). These facts may suggest to other nations that the U.S. has renewed its interest in biological weapons and may to some nations suggest potentially hostile intent.

To take a specific example, at the University of Massachusetts at Amherst research sponsored by the BDRP has the stated purpose of developing an improved vaccine for troops stationed in developing countries where anthrax is a problem. A number of groups including PHR and PSR have expressed concern about this work. Underlying this concern, as Dr. Richard Novick, Director of the Public Health Research Institute in New York City, has pointed out, is the knowledge that there are already several effective (though not perfect) vaccines against anthrax; that the naturally-occurring organism is extremely sensitive to treatment by standard antibiotics thereby minimizing the need for a vaccine; and that there is no current threat of naturally-occurring anthrax that would justify widespread immunization. There are indeed diseases such as malaria and typhoid, which affect millions of people and for which control measures are inadequate, on which intensive research to find methods to protect troops as well as civilians would surely be justified. But anthrax is not one of these diseases. Anthrax, in short, would seem to be of interest not because of its natural occurrence but because of its potential as a biological weapon.

Given this relatively low public health priority for the development of another anthrax vaccine, we became concerned about this research for two reasons that I believe are relevant to these hearings: (1) Research of this kind inevitably poses some risk of release of virulent organisms into the environment with the danger of infection of people or animals in the surrounding community; and (2) Research of this kind inevitably contributes to escalating development, production and stockpiling of biological weapons with the danger of use of these weapons in war or terrorism or their accidental dissemination.

While it seems clear from the material available in the open literature on the research in question that efforts have been made to prevent release of virulent organisms into the environment, a prudent approach to the protection of public health demands that even events felt to be of low risk for occurrence must be considered if the results of their occurrence has the potential for extraordinary damage to health. As Dr. Novick has testified before the Amherst Board of Health, part of this research involves the transfer to Bacillus Anthracis of plasmid-carried resistance to standard antibiotics, which could interfere with the current treatment of anthrax. Furthermore, he notes, anthrax strains have been developed in this project that can readily transfer virulence-determining genes to related but naturally-nonpathogenic strains of bacteria. Because of the high frequency of transfer of these altered virulence factors, an inadvertant mixing of two of the nonvirulent strains under study could spontaneously regenerate virulent anthrax bacteria. Such an accident might not even be detected until the disease broke out. Furthermore, this research is consdered by Dr. Novick to have offensive potential and to have no relevance to vaccine development.

The Programmatic Environmental Impact Statement for this research prepared by the U.S. Army describes the "consecutive occurrence" of events that would have to take place for the "release of a potentially hazardous organism to the environment." The Statement states that this occurrence is "highly unlikely." PHR and PSR requested the Amherst Board of Health to consider whether the risk of such an event, even though "highly unlikely," is an acceptable one for a Board charged with the protection of the health of its population. The concept of "acceptable risk" in public health is usually one in which a potential risk is compared to a potential benefit. In this case we believe it is impossible to justify the potential risk in relation to the potential benefit.

The second issue of concern in relation to the research sponsored by the BDRP at Amherst and in other sites is the fact that the distinction between "offensive" and "defensive" research in biological weapons is for all practical purposes meaningless. Any nation preparing a stockpile of biological weapons for use in war (whether the purpose is labelled as "deterrence," retaliation," or "first use") would have to prepare vaccines and other defensive measures to protect its own troops and population. Thus "offensive" and "defensive" research are inextricably joined. Indeed, the reason military forces invariably give publically for the possession of any potential biological weapons agent is that it is needed for preparation of defenses.

It is impossible, in other words, for other nations to determine whether "defensive" research is part of preparation for "offensive" use of such weapons. For example, in this case the Draft Programmatic Environmental Impact Statement under "Research Benefits" notes: "Ideally, the military benefit would be the availability of a vaccine that could be used to protect large numbers of troops should protection against anthrax ever be identified as a military medical priority." Plans to immunize troops rather than the population under potential attack may suggest to other nations a possible scenario in which this vaccine is administered to one's own troops prior to the use of anthrax as a biological weapon against an enemy.

Another general area of concern, as we have noted, is the potential for genetic engineering to produce agents that sould be more effective as biological weapons. In testimony to House Select Committee on Intelligence in 1986 Douglas Feith, Under Secretary of Defense, stated: "Recent scientific developments in genetic engineering have radically altered the BW picture and now make it "possible to synthesize BW agents tailored for military specifications." Certainly some agents can be developed that are extremely dangerous, but that does not necessarily solve the problem of their uncontrolability or make them otherwise effective for use as a weapon. It simply increases their threat to civilian populations.

In summary, we believe

1) Biological weapons, like chemical weapons, are largely anti-civilian weapons. Troops can often be protected, fully or partially. Civilians, particularly the very young, the old and the sick usually cannot be protected. These weapons have therefore been called "public health in reverse" and have earned the abhorrence in which they are held by all civilized people. Indeed it is for this reason that over 800 physicians and scientists have signed a pledge not to "engage in research or teaching that will further the development of chemical or biological warfare agents."

2) Any research targeted at development of defenses against biological weapons that is ambiguous enough to cause other nations to believe that an offensive capability is being developed and therefore causes them to work on biological weapons is to everyone's detriment. It merely makes the eventual use by terrorists or others more likely, with no discernible benefit.

3) If the intent of current DoD biological programs is indeed defensive, then it appears logical to hand them over to civilian agencies, with the presumption of prompt, regular reporting of all research methods and of all findings in the open scientific and medical literature, thus avoiding even the appearance of strengthening offensive capability without sacrificing the capability to defend as effectively as possible against biological weapons attacks by others.

4) Regarding a strong convention outlawing biological weapons and its verification, this suggests the need for a worldwide inspection capacity under international control. Much work is required on the methods, including the needed access, for verification.

Based on this information and on these views I would like to present a set of recommendations for the consideration of your committee. These recommendations are consistent with the positions of the Physicians for Human Rights and of the Physicians for Social Responsibility.

1. We urge that you support, and introduce into the Senate, the Biological Defense Safety Bill (HR806) that will require annual publication of a list of all organisms used at each location where projects are carried out under BDRP sponsorship, including both Army and other Federal facilities and a large number of universities and other private contractors across the country. Such information would permit medical facilities to act promptly and effectively if an accident should occur, actions sure to be less effective without prior knowledge of the organisms involved. Such publication could also allay anxiety in the neighboring communities and in other nations about the types of organisms being used and would reassure them that the U.S. is not developing new weapons using genetic engineering techniques. It would encourage other nations to act similarly and would be a means of increasing the effectiveness of the Biological Weapons Convention.

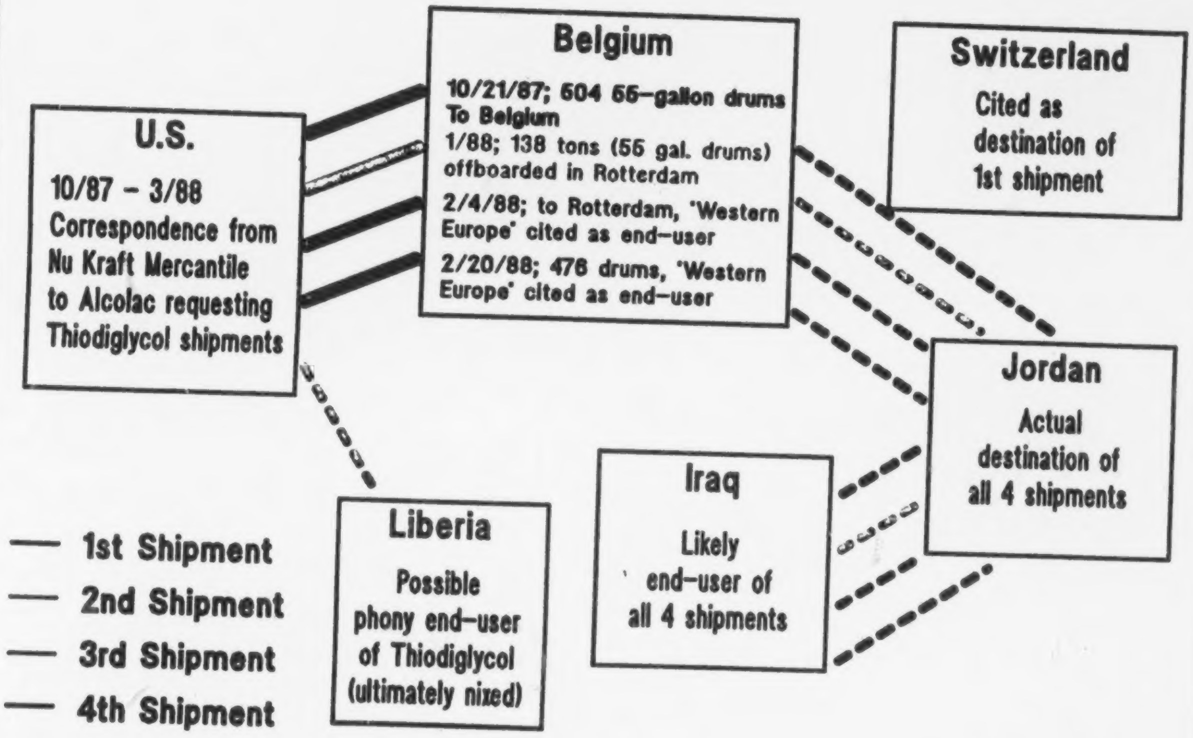
2. With regard to research on vaccines or on other medical or public health measures, we believe this should never be conducted under the sponsorship of the BDRP or under any other military auspices. Any such research should be sponsored by the National Institutes of Health or other recognized health agencies. There may be an argument for military involvement in the development of protective gear or other barriers to the spread of organisms, but we believe even this work should be subject to prompt, regular reporting in the open scientific and medical literature to emphasize its defensive intent and to make the knowledge available to all nations.

3. We urge that you support strengthening of the Biological Weapons Convention through the negotiation of a new protocol on verification to be considered when the Convention is reviewed in 1991. This will require expanded research on verification methods, starting immediately.

4. We urge that you support, and introduce into the Senate, the Biological Weapons Bill (HR237) that provides criminal penalties for violation of the Biological Weapons Convention by any person or agency in the U.S.; this legislation is required as a follow-through on U.S. ratification of the Convention, and will serve as an anti-terrorist, anti-proliferation measure.

Your committee has an historic opportunity to respond to the repugnance that is universally and instinctively felt about biological weapons by taking leadership in finding ways to ban them from the face of the earth. Generations not yet born will thank you if you do.

CASE A1 – THIODIGLYCOL



U.S.

10/87 – 3/88
Correspondence from Nu Kraft Mercantile to Alcolac requesting Thiodiglycol shipments

Belgium

10/21/87; 504 55–gallon drums To Belgium
1/88; 138 tons (55 gal. drums) offboarded in Rotterdam
2/4/88; to Rotterdam, 'Western Europe' cited as end–user
2/20/88; 476 drums, 'Western Europe' cited as end–user

Switzerland

Cited as destination of 1st shipment

Jordan

Actual destination of all 4 shipments

Iraq

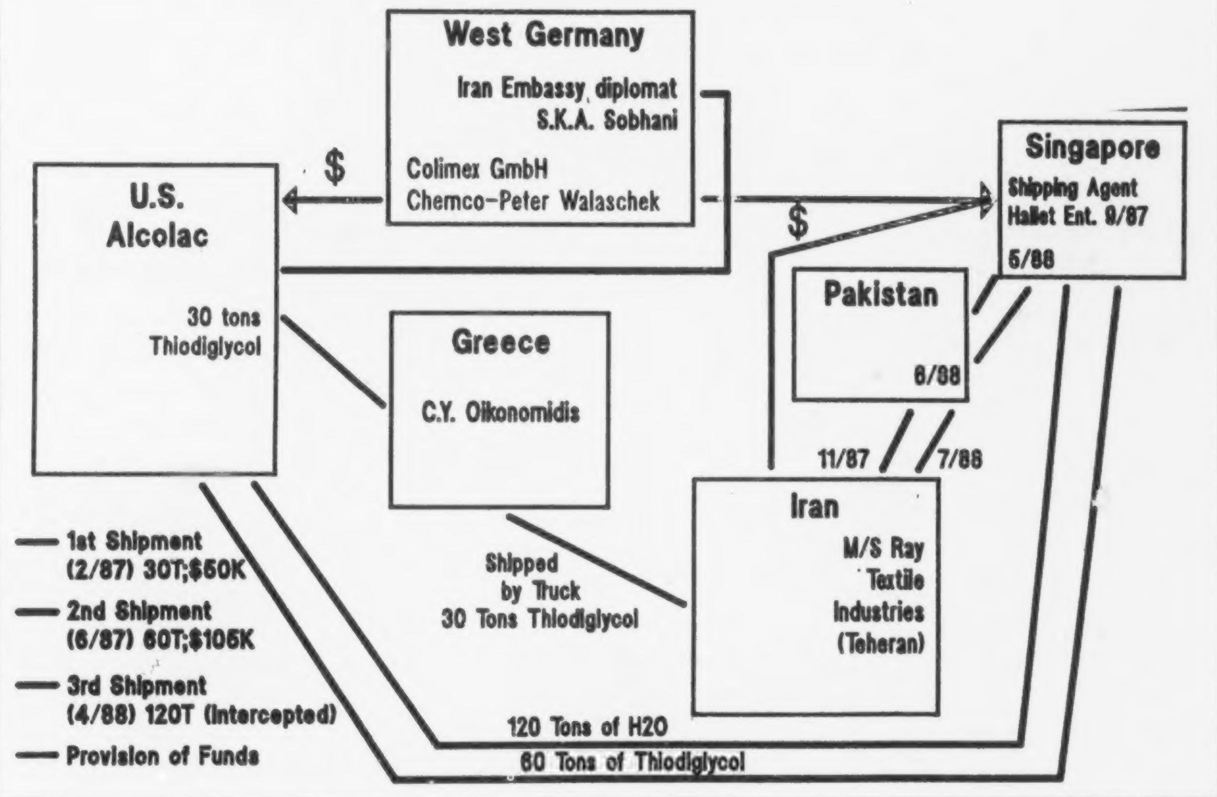
Likely end–user of all 4 shipments

Liberia

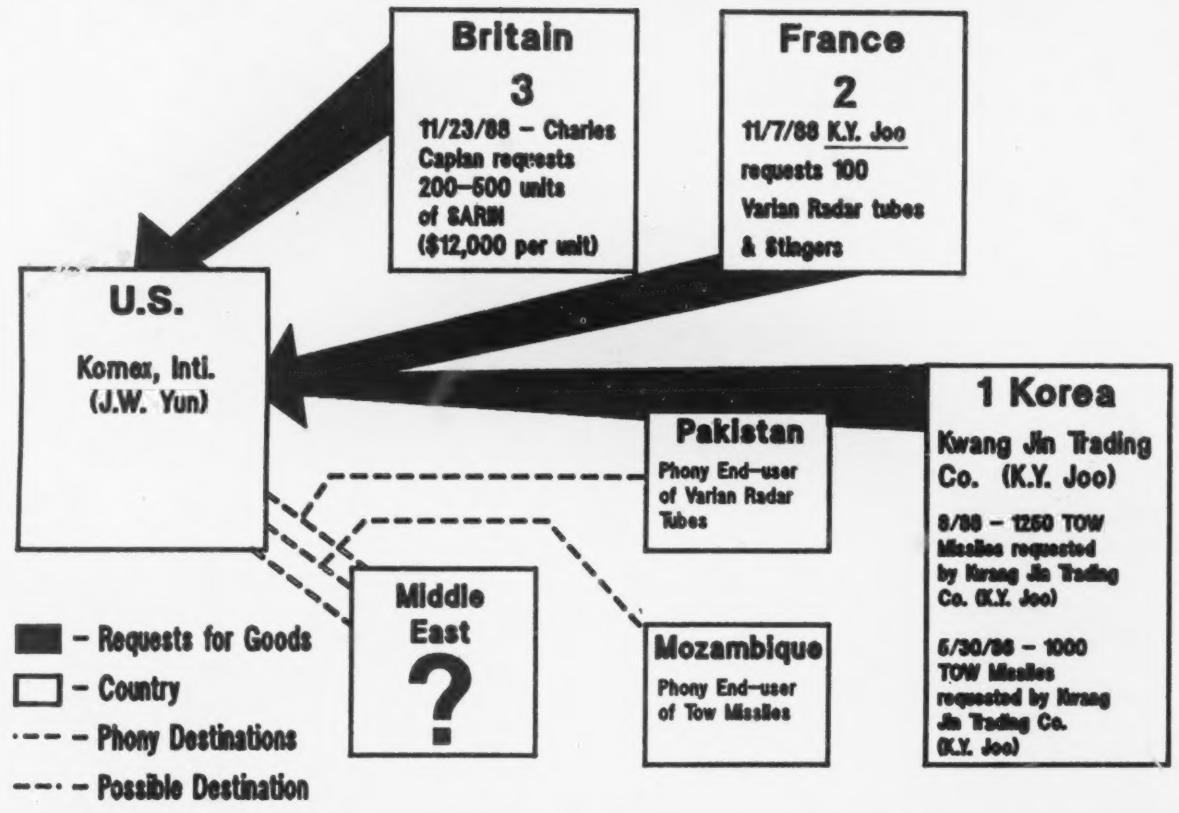
Possible phony end–user of Thiodiglycol (ultimately nixed)

— 1st Shipment
— 2nd Shipment
— 3rd Shipment
— 4th Shipment

CASE A2 – THIODIGLYCOL

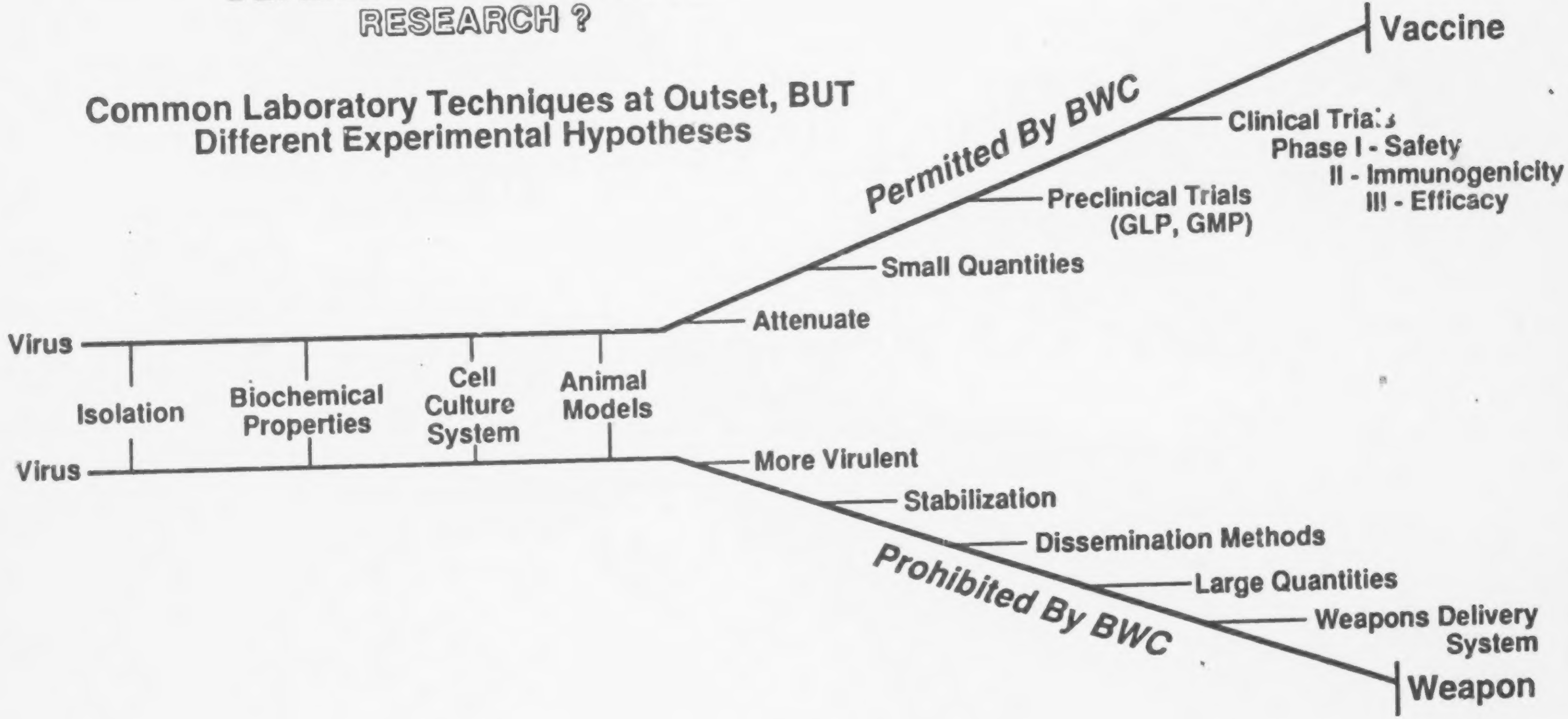

West Germany
Iran Embassy, diplomat
S.K.A. Sobhani
Colimex GmbH
Chemco–Peter Walaschek
$
$
U.S.
Alcolac
30 tons
Thiodiglycol
Greece
C.Y. Oikonomidis
Singapore
Shipping Agent
Hallet Ent. 9/87
5/88
Pakistan
6/88
11/87
7/88
Iran
M/S Ray
Textile
Industries
(Teheran)
Shipped
by Truck
30 Tons Thiodiglycol
120 Tons of H2O
60 Tons of Thiodiglycol
— 1st Shipment
(2/87) 30T;$50K
— 2nd Shipment
(6/87) 60T;$105K
— 3rd Shipment
(4/88) 120T (Intercepted)
— Provision of Funds

CASE B – SARIN NERVE GAS; TOWs


Britain
3
11/23/88 – Charles Caplan requests 200–500 units of SARIN ($12,000 per unit)
France
2
11/7/88 K.Y. Joo requests 100 Varian Radar tubes & Stingers
U.S.
Komex, Intl. (J.W. Yun)
1 Korea
Kwang Jin Trading Co. (K.Y. Joo)
8/88 – 1250 TOW Missiles requested by Kwang Jin Trading Co. (K.Y. Joo)
5/30/88 – 1000 TOW Missiles requested by Kwang Jin Trading Co. (K.Y. Joo)
Pakistan
Phony End–user of Varian Radar Tubes
Mozambique
Phony End–user of Tow Missiles
Middle East
?
– Requests for Goods
– Country
– Phony Destinations
– Possible Destination

DEFENSIVE OR OFFENSIVE RESEARCH ?

Common Laboratory Techniques at Outset, BUT Different Experimental Hypotheses


Virus
Isolation
Biochemical Properties
Cell Culture System
Animal Models
Virus
Attenuate
Small Quantities
Preclinical Trials (GLP, GMP)
Clinical Trials
Phase I - Safety
II - Immunogenicity
III - Efficacy
Permitted By BWC
Vaccine
More Virulent
Stabilization
Dissemination Methods
Large Quantities
Weapons Delivery System
Prohibited By BWC
Weapon

F.A.S. ***PUBLIC INTEREST REPORT***

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ANTHRAX OUTBREAK IN SVERDLOVSK

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THE BIOLOGICAL WEAPONS CONVENTION AND THE SVERDLOVSK ANTHRAX OUTBREAK OF 1979

Matthew S. Meselson

The Sverdlovsk controversy. In April and May 1979, a major outbreak of anthrax occurred in the city of Sverdlovsk, 900 miles east of Moscow. The first published report that correctly identified its place and time appeared in January 1980 in *Possev*, a Russian-language magazine based in Frankfurt. The report was datelined Sverdlovsk, November 1979, and was attributed to an anonymous source. Its author prefaced his account by saying that rumors about the event gradually became more detailed, producing a picture of what had happened. According to this reconstruction, there was an outbreak of a disease thought to be anthrax; the outbreak was attributed to a cloud of bacteria produced by an explosion early in April at a military facility at the southwest edge of Sverdlovsk; the first victims were hospitalized on April 4 and died a few hours afterwards; military medical personnel replaced civilians in the unit of the Sverdlovsk city hospital set aside for the patients; an average of 30-40 new cases per day were brought in for a month and the number of deaths was estimated to be roughly a thousand. A month after the *Possev* article, the mass-circulation West German tabloid *Bild Zeitung* published an essentially similar account, adding that "a Western intelligence agency" had determined that the alleged explosion occurred in a factory for bacteriological bombs.

Then as now, any development or production of biological weapons would be a gross violation of the Biological Weapons Convention of 1972, a treaty to which both the US and the USSR are parties. In mid-March 1980, the US Embassy in Moscow asked the Soviet Foreign Ministry for an explanation of what had happened in Sverdlovsk. The Soviets replied, in a note delivered to the Embassy a few days later, that there had been a natural outbreak of anthrax among livestock in March and April 1979, and that people had contracted intestinal anthrax as a result of eating the meat of animals marketed in violation of veterinary regulations. Even before the Soviet response was received, however, leaks from the White House generated immediate world-wide publicity and accusations of Soviet treaty violations. In the opinion of some, this pre-empted any possibility there may have been for resolving the issue in diplomatic channels. Ever since that time, the US government has rejected the Soviet explanation and has maintained that it possesses evidence that the outbreak resulted from an accidental release of anthrax spores into the air at a biological weapons facility, in violation of the Biological Weapons Convention. Even before 1979 there had been reports in the US press of suspect biological weapons facilities in several Soviet cities, including Sverdlovsk. One may well ask how solid the US case really is, but both the evidence and its evaluation remain largely classified. What is clear, however, is that the controversy still exerts an important influence on western attitudes toward arms control and biological defense programs.

Information published by the Soviets in 1980. Until recently, the Soviets provided only rudimentary information about the Sverdlovsk anthrax outbreak. An article by two prominent Moscow physicians, I.S. Bezdenezhnykh, an epidemiologist, and V.N. Nikiforov, an infectious disease specialist, appeared in the May 1980 issue of the Soviet journal *Microbiology, Epidemiology and Immunology*. It stated that cases of human cutaneous and intestinal anthrax in Sverdlovsk were preceded by an outbreak of anthrax among privately owned farm animals probably caused by contaminated feed. Anthrax bacteria were found in meat in two households in which there were human cases. The meat was purchased from private sellers at makeshift markets. Humans and animals in the affected areas of the city and in nearby villages were vaccinated, suspect meat was confiscated and sites of suspected contamination were disinfected. The article did not give the number of persons affected and made no mention of deaths. A second publication, describing the prosecution and sentencing of two individuals who slaughtered sick cattle and sheep and sold the meat in violation of veterinary regulations, appeared the following September in the Soviet journal *Man and the Law*.

On several occasions since 1980, Americans and others, both official and unofficial, sought additional information from Soviet officials, without success. What was particularly lacking was the provision of knowledgeable Soviet experts authorized to discuss the outbreak with their professional counterparts abroad. It could be asked in retrospect why no one tried to contact the two authors of the published epidemiological report, whose professional addresses in Moscow appeared in their article. But the matter was seen as an issue of high-level East-West policy during a time of tense US-Soviet relations, and this may have kept even private scientists concerned with the matter from thinking of so collegial an approach. Nor is it clear that it would have succeeded. For years, it had been Soviet policy not to release even ordinary health statistics. Since Gorbachev, however, detailed health statistics are published on a regular basis.

New information since Gorbachev. Encouraged by the new openness, in June 1986, I renewed earlier requests to Soviet officials to arrange scientific discussions of the Sverdlovsk outbreak. My request was made via Dr. Martin Kaplan, Secretary-General of the Pugwash Conferences on Science and International Affairs in Geneva. This was successful and on August 27-30, I met in Moscow with Dr. P.N. Burgasov, Deputy Minister of Health, Dr. V.N. Nikiforov, Head of the Department of Infectious Diseases at the Central Postgraduate Institute, Dr. I.S Bezdenezhnykh, Chief Epidemiologist of the Russian Federation, and Dr. O.V. Yampolskaya, assistant to Nikiforov. Bezdenezhnykh and Nikiforov were the authors of the May 1980 article referred to above. The discussions took place mainly in the office of Dr. Nikiforov and in an adjacent classroom at the famous old Botkina Hospital. We also met over meals at the nearby hotel where I stayed. On the third day, I briefed officials at the US Embassy on what the Soviet physicians had said and on plans for further communication. One of the steps agreed upon was a scientific lecture tour in the US.

On April 10-17 of this year, Drs. Burgasov and Nikiforov and Dr. V.P. Sergiev, newly appointed Director of the Institute of Medical Parasitology and Tropical Medicine in Moscow, gave formal presentations and took part in informal discussions about the Sverdlovsk outbreak at the US National Academy of Sciences in Washington, the Johns Hopkins School of Hygiene and Public Health in Baltimore and the American Academy of Arts and Sciences in Cambridge. Dr. Alexander Langmuir, former Director of Epidemiology at the USPHS Centers for Disease Control in Atlanta was moderator for the formal presentations and a panel of US experts acted as discussants. The host in Baltimore was Dr. D.A. Henderson, Dean of the Johns Hopkins School of Hygiene and Public Health. The American Academy was the overall host and support was provided by the MacArthur Foundation. The audiences and discussants included more than 200 private and government medical scientists and arms-control specialists.

What emerged from these presentations and informal discussions was a detailed elaboration of the original Soviet account. It is plausible and consistent with what is known from previous outbreaks of human and animal anthrax in the USSR and elsewhere, including the US. In addition, participants in the discussions agreed to collaborate in the further study and documentation of the Sverdlovsk outbreak. The projects contemplated include review and publication of the large amount of patho-anatomical and histological data from the outbreak, medical examination and interview of survivors, and a detailed compilation of epidemiological data.

Although sizeable outbreaks continue to occur in parts of Africa and Asia, the world scientific literature on human intestinal anthrax is scanty and in important respects inconsistent. Some of the attendant uncertainties definitely impeded the efforts of US government officials to interpret the information available to them in 1980. International cooperation in the further study of the Sverdlovsk outbreak presents an unprecedented opportunity both to learn more about the disease and to clarify further the actual events that occurred.

Summary of the account of the Soviet physicians. During the course of the outbreak, all five of the Soviet physcians, on whose account this summary is based, went from their posts in Moscow to deal with various aspects of the situation in Sverdlovsk. Dr. Burgasov, as Deputy Minister of Health, was in overall charge. Dr. Nikiforov set up a special unit to screen and treat the patients at city hospital number 40, where he was assisted by Dr. Yampolskaya and others from Moscow, including a son of Dr. Burgasov. Dr. Bezdenezhnykh and later Dr. Sergiev investigated the epidemiology of the animal and human cases. Nikiforov organized and Sergiev took part in the mass vaccination of persons thought to be at risk.

The first patients were hospitalized on April 4 and the last was hospitalized on May 19. The number of cases presenting each day through April 19 was 5, 5, 5, 7, 7, 6, 10, 9, 7, 5, 4, 4, 1, 0, 0, and 1. Twenty additional cases were hospitalized after that, no two on the same day. Altogether, 96 people were diagnosed with anthrax. Despite intensive antibiotic and anthracic globulin therapy, 64 died. It was the largest outbreak of human anthrax ever to occur in the Soviet Union.

During the course of the epidemic, more than a thousand patients with suspicious symptoms such as fever or stomach pain were taken to hospital number 40 to be screened for anthrax infection. In all, there were 17 cases of cutaneous anthrax and 79 of the intestinal form. All of the patients with cutaneous anthrax survived, although 6 of them had toxemia. Except for one 6-year old girl who survived, all the patients were adults, about two-thirds of them men. About 70 percent of the patients resided in southern Sverdlovsk and nearby suburbs, the others in other parts of the city.

The symptoms of intestinal anthrax observed at Sverdlovsk and also known from earlier cases are diverse and variable. They include very sudden onset, chills, headache, high fever, vomiting, diarrhea, stomach pain, rapid and then failing pulse, loss of blood pressure, cyanosis, gasping, poor blood clotting and death. The gastro-intestinal symptoms are often not present until later stages. In fatal cases, death occurs within 48 hours of onset. Reliable diagnosis of intestinal anthrax requires examination at autopsy and bacteriological tests. All of the fatal cases were autopsied. Dr. Nikiforov projected a series of color photographs taken at autopsy. There was one photograph of the entire body cavity of a male victim. It showed numerous large discrete hemorrhagic lesions of the intestinal surface. Other photographs showed closer views of affected tissues and histologic sections from this and other victims. There was a wide distribution in the number of discrete intestinal lesions, ranging from hundreds, in some victims, to only one. In other cases no discrete lesion was found but the intestinal wall exhibited a diffuse hemorrhagic appearance. Lymph nodes draining the intestines had hemorrhagic necrosis and contained anthrax bacilli. There was edema but no inflammation of the lungs. In victims who died after a relatively prolonged course, hemorrhage was seen over a much wider area, including the brain. The concentration of anthrax baccilli in the blood reached values up to 500,000 per milliliter. Each of the dead was placed in a wooden coffin with chlorinated lime and buried in a city cemetery where records of each burial are kept. No sequelae were seen 1-2 years later in patients who survived.

Infected meat products were suspected, but the pathogen was not found in meat sampled from food factories, restaurants and canteens that provide meat inspected by the veterinary service. One contaminated sample was obtained by police at a check point set up to confiscate uninspected meat coming into the city. Contaminated samples were also found in the refrigerators of some of the anthrax patients. These had been obtained from private sources. Field investigation revealed that in late March and April there had been an anthrax epizootic among cattle, sheep and pigs in at least 8 different villages and settlements in the area south of the city. Cases of cutaneous anthrax appeared among those who had slaughtered and butchered the sick animals.

It is thought that hundreds or even a few thousand persons ate contaminated meat. Common cooking methods do not adequately inactivate anthrax spores. Usually the cases were sporadic but there were at least three clusters. The largest, accounting for almost one-third of the intestinal cases, was among workers at a large ceramics factory in southern Sverdlovsk. On April 8, the factory received a number of cattle carcasses and the meat was put on sale. At least one of the carcasses was infected. In another case, two men and a woman who butchered an infected sheep developed cutaneous anthrax. In another, a woman and her male friend ate contaminated meat and both died. The fact that only one child (who survived) had intestinal anthrax was attributed to the custom of reserving available meat for the adult family member doing the heaviest labor and to the fact that children have their main meals in schools that serve only inspected meat.

The epizootic was traced to contaminated bone meal used as a feed supplement. This came from a single 29 ton lot of bone meal produced at a meat processing plant at Aramil, a town 15 km southeast of Sverdlovsk. It was put on sale March 25. The first known associated case of animal anthrax appeared March 29. In the winter of 1979 supplies of fodder were low and meat was scarce. In order to boost production it was decided to make available to private owners of meat animals a bone meal feed supplement. This consists of bones and other slaughterhouse waste mixed with grain. It is autoclaved to inactivate anthrax spores and other infectious organisms. Procedures at the Aramil facility violated the established technical regulations. Autoclave pressure readings were not taken, records of sterilization times were not kept, the raw material and the autoclaved material were handled in the same area and transported in the same wheelbarrows, and microbiological analysis was not carried out.

Bacillus anthracis was isolated from patients, from samples of infected meat, from carcasses of diseased animals and from the Aramil powder. All of these isolates were judged to be of the same strain on the basis of elementary bacteriological tests.

Road-blocks were set up to prevent uninspected meat from entering the city. Contaminated meat and feed were destroyed by open air burning. There were a few cases of anthrax among stray dogs; consequently approximately 300 strays were destroyed. About 30 buildings where possibly infected animals were slaughtered and butchered were doused with gasoline and burned. Burning sites were typically left as is, not covered over with asphalt or such. Refrigerators and other surfaces suspected of contamination were disinfected with chloramine solution. As prophylaxis, members of patients' families were given antibiotics. Warnings against consuming meat from private sources, citing the risk of anthrax, were broadcast on the radio, published in newspapers, and distributed in posters and leaflets.

Several foreigners were present in Sverdlovsk during the outbreak. One of these was Professor Donald Ellis of Northwestern University in Evanston, Illinois. He was a US National Academy of Sciences exchange scientist who came with his family and worked at the Institute of Chemistry and Physics from mid-April to mid-May. In mid-June, the Ellises returned to Sverdlovsk and stayed until the end of July. (Ellis has told journalists that he was not aware of the outbreak until he returned to the United States.)

Contrary to the US government version of the event, there was no evidence of inhalatory anthrax. All epidemiological, clinical and patho-anatomical evidence supported the diagnosis of intestinal and cutaneous anthrax. Also contrary to the US version, there were no anthrax cases among military personnel, military medical personnel never took over from civilians at hospital number 40, and there was no aerial spraying of disinfectant. There is indeed a military facility in Sverdlovsk that studies infectious diseases. The existence and location of this facility were published last year in the declarations submitted by the Soviet government to the World Health Organization, in accord with an agreement among the parties to the Biological Weapons Convention. When asked the purpose of the military facility in Sverdlovsk, Dr. Burgasov responded that the question should be addressed to the Defense Ministry. (According to the Soviet declaration, the facility studies mechanisms of the spread of diseases significant for the military but has no pathogens.)

The overall conclusion presented by the Soviets is that the outbreak was caused by (i) improper procedures in the production of bone meal at the Aramil facility; (ii) the failure of private animal owners to observe regulations requiring official veterinary approval for slaughter of sick animals; (iii) the illegal sale of meat from such animals; and (iv) inadequate supervision by the veterinary services.

Next steps. It is already clear that the US version of the Sverdlovsk anthrax outbreak is in need of careful and objective review. Continued Soviet willingness to provide information and documentation regarding the outbreak has the potential of removing any remaining reasonable doubt that the outbreak was a natural occurrence. Beyond that, there is the question of the military biological facility in southwest Sverdlovsk. Now that the facility has been declared under the provisions agreed upon in 1986 by the parties to the Biological Weapons Convention, it may be possible, on a reciprocal basis, for the Soviets to open the facility and to allow its personnel to meet freely with scientists from other countries. If so, concern about its present mission should be laid to rest. Depending on what is learned, controversy over its work in past years may or may not also be dispelled. Of course, the value of such opening and the Soviet incentive for undertaking it depends in part on the willingness of the US government to conduct a truly objective review of its own previous positions. What is clear is that the best way to protect the mutual interest of the US and the USSR in maintaining and strengthening world-wide restraints against the hostile use of biology is to foster a policy of open laboratories and free communication among biological scientists. ■

SVERDLOVSK AND THE BIOLOGY OF ANTHRAX

Anthrax occurs widely as a disease of livestock. Bacillus anthracis, the infectious agent of anthrax, is a bacterium capable of existence in two different forms. Cells of the vegetative form multiply in the infected animal, producing potentially lethal anthrax toxin as they do so. If vegetative cells from an infected carcass are exposed to air, they can transform themselves into thick-walled spores that do not multiply but which can remain viable in the soil for many years. Upon subsequent infection of a new host animal, the spores return to the vegetative form, re-initiating the cycle.

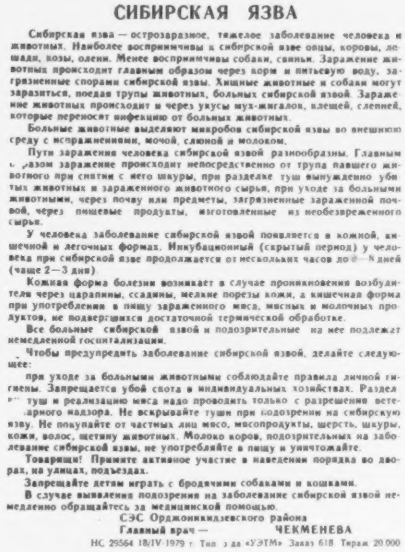
Although greatly reduced by modern practices of animal husbandry and immunization, anthrax outbreaks among cattle, sheep and other livestock continue to occur in many countries. Thirty European nations, including the USSR, report the number of outbreaks of anthrax in livestock each year to the Office International des Epizooties in Paris. For the decade 1971-1980, a total of 13,068 outbreaks were reported to the O.I.E., including 2607 in the USSR. The most recent large anthrax outbreak reported in the US occurred in 1976 in Texas, resulting in the death of some 160 cattle and horses. Several epizootics in Europe and the US have been traced to contaminated bonemeal used as a livestock food supplement. In 1952, for example, hundreds of swine in Ohio and neighboring states contracted anthrax traced to a single 100 ton lot of imported bonemeal that had been inadequately sterilized.

In the USSR, there are several regions endemic for animal anthrax. One of these is Sverdlovsk oblast, an area of approximately 195,000 square kilometers on the eastern side of the Ural mountains, including the city of Sverdlovsk (population 1.2 million). A 1974 publication recorded 35 outbreaks in the Sverdlovsk oblast for the period 1956-1968.

In human beings, anthrax generally results from handling or eating products from animals stricken with the disease or from inhaling spores from contaminated hides, hair and other materials. Infections of the external skin form sores that usually remain localized and then heal. In contrast, untreated systemic infection, as may be initiated by inhalation or ingestion, is usually fatal.

Air-borne and food-borne systemic anthrax are difficult or impossible to distinguish on the basis of clinical symptoms alone. Presumably, this is because the principal clinical symptoms in both cases are caused by the toxin that is released from the bacterial cells and quickly becomes distributed throughout the body.

Before the Sverdlovsk outbreak, the largest outbreak of fatal human anthrax in the Soviet Union described in the medical literature occurred in 1927 in the city of Yaroslavl, 150 miles northeast of Moscow. In that case, 27 persons fell ill with a diagnosis of intestinal anthrax and all of them died. The probable source of infection was reported to be cooked sausage. As in Sverdlovsk, it appeared that many more persons ate the contaminated meat than the number who fell ill, presumably reflecting variations in dose and in individual susceptibility.



СИБИРСКАЯ ЯЗВА

Сибирская язва — острозаразное, тяжелое заболевание человека и животных. Наиболее восприимчивы к сибирской язве овцы, коровы, лошади, козы, олени. Менее восприимчивы собаки, свиньи. Заражение животных происходит главным образом через корм и питьевую воду, загрязненные спорами сибирской язвы. Хищные животные и собаки могут заразиться, поедая трупы животных, больных сибирской язвой. Заражение животных происходит и через укусы мух-жигалок, клещей, слепней, которые переносят инфекцию от больных животных.

Больные животные выделяют микробов сибирской язвы во внешнюю среду с испражнениями, мочой, слюной и молоком.

Пути заражения человека сибирской язвой разнообразны. Главным образом заражение происходит непосредственно от трупа павшего животного при снятии с него шкуры, при разделке туш вынужденно убитых животных и зараженного животного сырья, при уходе за больными животными, через почву или предметы, загрязненные зараженной почвой, через пищевые продукты, изготовленные из необезвреженного сырья.

У человека заболевание сибирской язвой появляется в кожной, кишечной и легочных формах. Инкубационный (скрытый период) у человека при сибирской язве продолжается от нескольких часов до 6—8 дней (чаще 2—3 дня).

Кожная форма болезни возникает в случае проникновения возбудителя через царапины, ссадины, мелкие порезы кожи, а кишечная форма при употреблении в пищу зараженного мяса, мясных и молочных продуктов, не подвергшихся достаточной термической обработке.

Все больные сибирской язвой и подозрительные на нее подлежат немедленной госпитализации.

Чтобы предупредить заболевание сибирской язвой, делайте следующее:

при уходе за больными животными соблюдайте правила личной гигиены. Запрещается убой скота в индивидуальных хозяйствах. Разделку туш и реализацию мяса надо проводить только с разрешения ветеринарного надзора. Не вскрывайте туши при подозрении на сибирскую язву. Не покупайте от частных лиц мясо, мясопродукты, шерсть, шкуры, кожи, волос, щетину животных. Молоко коров, подозрительных на заболевание сибирской язвы, не употребляйте в пищу и уничтожайте.

Товарищи! Примите активное участие в наведении порядка во дворах, на улицах, подъездах.

Запрещайте детям играть с бродячими собаками и кошками.

В случае выявления подозрения на заболевание сибирской язвой немедленно обращайтесь за медицинской помощью.

СЭС Орджоникидзевского района
Главный врач — ЧЕКМЕНЕВА
НС 29564 18/IV-1979 г. Тип. з-да «УЭТМ» Заказ 618. Тираж 20 000

Leaflet dated April 18, 1979, warning residents of the Ordzhonikidze district of Sverdlovsk about the danger of contracting anthrax from infected animals and uninspected meat and other animal products.

ANTHRAX

Anthrax is a highly infectious, serious illness of man and animals. The most susceptible are sheep, cows, horses, goats and deer. The least susceptible are dogs and pigs. Animals are infected primarily through feed and drinking water, contaminated with anthrax spores. Predators and dogs can become infected while eating the carcasses of animals with anthrax. Animals can also become infected through the bites of mosquitoes, ticks and horseflies which carry infection from sick animals.

Sick animals excrete anthrax microbes into the environment through feces, urine, saliva and milk.

Man can become infected in a variety of ways. The principal path of infection is through direct contact with the carcass of a dead animal while removing its skin, cutting of the carcass of a slaughtered animal and infected animal raw material, and caring for sick animals and through the soil or objects contaminated with infected soil, and food prepared from contaminated raw material.

In man anthrax can be manifested as skin, intestinal and pulmonary forms. The incubation (latent period) in man with anthrax can last between several hours to 6-8 days (most often 2-3 days).

The skin form of the disease arises when the pathogene penetrates through scratches, abrasions or small cuts, while the intestinal form can occur when using contaminated meat or meat and dairy products which had not been properly processed thermally.

All patients with anthrax and those suspected of it must be hospitalized immediately.

To prevent anthrax, do the following: In caring for sick animals observe personal hygiene. The slaughter of cattle at individual farms is forbidden. Dissection of carcasses and cutting of meat can be done only by permission of the veterinarian. Carcasses should not be dissected if anthrax is suspected. Do not buy from private individuals meat, meat products, fur, skins, leather, hair or bristle of animals. The milk of cows suspected of having anthrax should not be used in food and should be destroyed.

Comrades! Take active part in bringing order to households, streets and entrances.

Do not allow children to play with stray dogs and cats.

Should symptoms of anthrax be suspected, immediately seek medical help.

SES of the Ordzhonikidze district
Chief physician— Chekmeneva
N.S. 29564, 4/18/79, Printed by "UETM," Order 618, 20,000 printed

Chemical Warfare Facilities in the Middle East EXHIBIT NO. 1

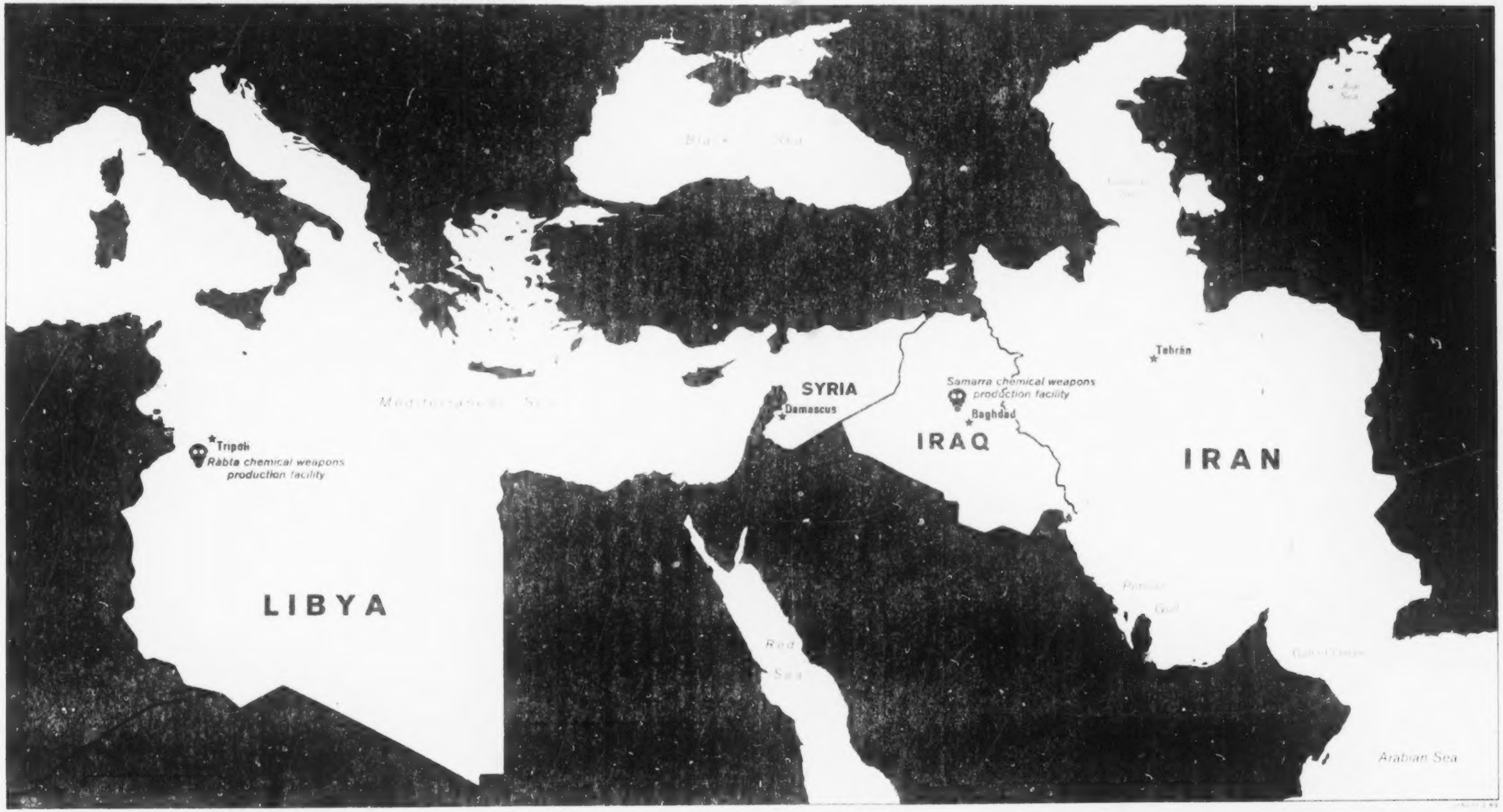

Black Sea
Aral Sea
Mediterranean Sea
SYRIA
Damascus
Tripoli
Rabta chemical weapons production facility
LIBYA
Samarra chemical weapons production facility
Baghdad
IRAQ
Tehrān
IRAN
Red Sea
Persian Gulf
Arabian Sea

EXHIBIT NO. 2

EMBASSY OF AUSTRALIA
WASHINGTON, D. C.

8 February, 1989

Senator Sam Nunn
Chairman
Permanent Sub-Committee on Investigations
Committee on Governmental Affairs
United States Senate
WASHINGTON, D.C.

Dear Mr Chairman,

The Australian Government is pleased to respond to your invitation to provide information for your Committee's hearings on Chemical Weapons.

The elimination of Chemical Weapons is one of our major disarmament priorities, and we particularly welcome this opportunity to present Australia's views to you. As the Conference on Disarmament progresses towards the completion of a Chemical Weapons Convention, and as international endeavours to ensure the elimination of Chemical Weapons intensify, we see it as vitally important to sustain a full and active dialogue with our close friends.

Only by our continuing effective collaboration will the international community ensure that the growing political momentum on this issue is translated into a verifiable world wide regime against Chemical Weapons. With many other observers, we are greatly heartened by President Bush's strong personal commitment to the elimination of Chemical Weapons. We look forward to the United States continuing its leading constructive role in bringing this about.

../2

I attach the text of the Australian Government's submission and wish you well in your considerations.

Yours sincerely,

Rawdon Dalrymple

(F.Rawdon Dalrymple)

Submission by the Government of Australia to the Hearings on Chemical Weapons by the Permanent Sub-Committee on Investigations of the Senate Committee on Governmental Affairs

1. GENERAL POLICY ON CHEMICAL WEAPONS

Australia's policy is to maintain firm and unqualified opposition to the use of chemical weapons (CW). We believe that no use of CW can be justified, regardless of the circumstances.

The eradication of CW is one of Australia's foremost disarmament priorities. Our central aim is to continue to live in a region free of CW and in a world made free of CW. The most desirable way to achieve this is through a universal, effectively verifiable convention eliminating all CW and CW production facilities, and prohibiting the development, acquisition, stockpiling, transfer and use of CW.

2. CHEMICAL WEAPONS PROLIFERATION

The Australian Government is concerned at the security threat posed by the proliferation of CW, and the potential for it to accelerate. This threat highlights the need for immediate, coordinated international action to curb the spread of CW, based on shared perceptions that the elimination of CW would enhance world security.

Australia shares U.S. concern that the Libyan chemical facility at Rabta is a dedicated CW production facility, and sees its construction as a disturbing symptom of a potential trend towards further proliferation.

3. CHEMICAL WEAPONS CONVENTION (CWC)

Australia has welcomed the recent progress in the negotiations for a CW Convention at the Conference on Disarmament in Geneva, and sees an effective convention as being achievable in the near future. However, it is concerned that artificial deadlines proposed for the conclusion of negotiations may compromise the ultimate effectiveness of the convention.

The most difficult question still to be resolved is that of ensuring adequate and feasible verification, and complex technical problems must be addressed before an acceptable solution is attained. Along with other members of the Conference on Disarmament, Australia is conducting a series of trial inspections of chemical plants in an endeavour to refine and resolve these problems in a practical way. Nevertheless, the question of what is adequate verification is essentially a political one, since the primary function of verification is to create political confidence that the convention is universally adhered to.

Australia appreciates the value of bilateral consultations between the United States and the Soviet Union as a stimulus to the Conference on Disarmament's negotiations, notably on the Chemical Weapons Convention. We also welcome the increased activity in the negotiations by a larger number of neutral and non-aligned countries, and by China. It is essential that the convention take full account of both the East/West and the North/South dimensions to achieve universal support.

4. CHEMICAL WEAPONS REGIONAL INITIATIVE

A major factor in the success of a completed Chemical Weapons Convention will be its rapid and wide-spread acceptance. For this to happen, there is a need for work to begin on cultivating a general understanding of the aims and requirements of a global ban on CW. It was in part this concern that prompted Prime Minister Hawke's announcement in New York last year that Australia would undertake a regional initiative on CW.

In pursuance of this initiative, a team of Australian officials is visiting the Governments of South East Asian and South Pacific nations to discuss CW issues. The talks are focussing on the threat that would be posed to our regional security environment by the spread of CW, and on the implications and aims of the CWC under negotiation in Geneva. Our objective is to ensure that our neighbouring countries are fully conversant with CW issues, and are ready, if they so choose, to adhere to the CWC as soon as it has been finalised.

Reactions to the team's visits so far have generally been very positive. Indonesia, in particular, has shown interest in cooperating with Australia in working towards the goals of the regional initiative. Our talks have highlighted the need to promote a greater understanding of CW issues and especially of the CWC negotiations. This regional initiative has been put forward as a model for fostering this understanding more widely and in other regions, and for maintaining the excellent forward impetus given to this issue by the recent Paris Conference.

Once the first round of visits has been concluded, we propose convening a regional seminar on CW, to discuss the security implications of CW for the region and the state of negotiations for the CWC.

5. EXPORT CONTROLS OVER CHEMICAL WEAPONS PRECURSORS

Prompted, like a number of other countries, by the first reports of chemical warfare in Gulf War, Australia introduced controls over the export of certain precursors for CW manufacture in 1984. Since then, Australia has convened a series of meetings of 20 OECD countries (informally known as the "Australia Group") to coordinate export controls over CW precursors, to exchange information and views about the potential for further CW proliferation and production, and to consider generally how to address the spread of CW. The United States plays a vital role in the success of this Group.

Our view is that this exercise has made it significantly more difficult and costly for potential proliferators to obtain CW feedstocks. It has also given focus and political momentum to international efforts to curb the spread of CW. It can, however, only serve as an interim measure to restrain CW proliferation, pending the conclusion of a universal, effectively verifiable convention.

Beyond the framework of the "Australia Group", we have continued to raise bilaterally with any Governments the pressing need for comprehensive export controls over CW precursors. While responses to our representations have varied, we have found continuing value in maintaining dialogue with other Governments to encourage them to implement controls in a timely, effective and coordinated manner.

Domestically, the Australian Government has held continuing discussions with industry on export controls. We have found industry bodies and individual firms responsive and cooperative, and concerned to ensure that the Australian chemical industry should not, even inadvertently, be implicated in Chemical Weapons manufacture. The Government has also worked to foster public awareness of the need for effective controls over the export of Chemical Weapons precursors.

EXHIBIT NO. 3

THE PROLIFERATION OF WEAPONS OF MASS DESTRUCTION:

THE NEED FOR STRONG AMERICAN ACTION

Senator John McCain

February, 1989

THE NEED TO FIGHT THE PROLIFERATION OF WEAPONS OF MASS DESTRUCTION WHILE WE STILL CAN

We need to realize that if we now ignore even limited uses of poison gas, or the stockpiling and proliferation of weapons of mass destruction, we will ultimately license massive threats to our friends, our strategic interests, our own forces, and ultimately our own territory. Iraq's use of poison gas has already accelerated the efforts of other nations to create major stockpiles of such weapons. U.S. government experts indicate that other countries in the Middle East are actively engaged in creating their own production facilities. Many nations throughout the Third World have reactivated research efforts in this area, and some may well be moving towards the production and stockpiling of such weapons.

There can be no question that the use of poison gas is also accelerating efforts to develop low cost biological weapons, and is interacting with efforts at nuclear proliferation. The moment the international community tolerates Iraq's use of poison gas, or Libya's creation of a massive new plant to produce chemical weapons, it tacitly tolerates the use of "small nuclear weapons".

The tolerance of chemical weapons also inevitably is linked to the tolerance of the development and deployment of biological agents like anthrax, tularemia, and equine encephalitis It encourages every Third World nation to find its own cheapest path to obtaining weapons of mass destruction, regardless of type.

We also have already seen a friendly state like Saudi Arabia turn to the PRC for the kind of IRBM whose only military merit lies in the eventual acquisition of chemical, biological, and/or nuclear warheads. U.S. government experts indicate that Israel and Egypt have renewed their search for long range missiles, and this is only the tip of the iceberg. For all its ritual denials, the PRC has become actively involved in selling long range missiles.

If we let poison gas be used against the Kurds or Iran without making every effort to protest use of such weapons, and the sale of the equipment to make and deliver them, then chemical and biological weapons will almost certainly be used against our own troops, and friends like Israel, Egypt, Jordan, and Saudi Arabia in the years to come. More broadly, we will repeat the mistakes the world made in tolerating Japanese use of poison gas against the Chinese, Italy's use of poison gas against Ethiopia, or Germany's experiments in the use of airpower to destroy civilians at Guernica, and Neville Chamberlain's indifference to the people of Czechoslovakia.

No part of the world has been far enough away for us to safely ignore for more than half a century. If we allow Iraq's example to fester and breed, and to contaminate the world, we will eventually reap the whirlwind. We will find ourselves in a world where every major regional conflict and tension leads to a new kind of proliferation. Ultimately, we will find ourselves thrust into one of these conflicts and ultimately, we will be the target.

Admittedly, we ourselves have been slow to realize the seriousness of this issue, and we ourselves may have had companies or groups which deliberately or unknowingly contributed to the process of proliferation. Admittedly, we ourselves are still dependent on nuclear and chemical weapons for deterrence, and cannot ignore the need for defensive research to defend against some other nation's use of biological warfare.

We also, however, were among the first to protest Iraq's use of chemical weapons in the Iran-Iraq War and to take this new fight against proliferation seriously. We are beginning to make real progress in moving towards the reduction or elimination of our nuclear and chemical weapons, and we destroyed all our biological weapons before 1975. We have well over a quarter of a century's experience in guiding us to avoid the use of such weapons and we are constantly seeking new safety and command and control arrangements.

The fact that weapons of mass destruction already exist is no excuse to deploy more such weapons. The proliferation of weapons of mass destruction is not a sane form of nationalism in the Third World, and it may ultimately destroy the validity of our own efforts at arms control.

TAKING ACTION TO HALT THE PROLIFERATION OF WEAPONS OF MASS DESTRUCTION

The question is what more we can do to halt proliferation. It is obvious that mere protests and resolutions will do little, if anything. At the same time, we have learned through our efforts in regard to the Non-Proliferation Treaty that we cannot simply force our will on other nations simply by obtaining new signatures on new treaties or other agreements.

I believe, therefore, that we must adopt a three point program that does not single out Iraq, but which attacks the problem on a global basis and which addresses the proliferation of all the elements of weapons of mass destruction: chemical weapons, nuclear weapons, biological weapons, and advanced delivery systems.

COMPREHENSIVE REPORTING ON THE PROLIFERATION OF WEAPONS OF MASS DESTRUCTION

The first step should be the kind of report on the proliferation of such weapons that goes far beyond the kind of summary report that is common in the U.S. government. To be specific, the President should be required to issue an annual report on each country in the world that is deliberately designed to embarrass the buyers and sellers of mass destruction in detail.

In the case of the buyers, it should require that the President report on the current activities of each Third World country in trying to develop or acquire chemical weapons, nuclear weapons, biological weapons, and missiles or other delivery systems suited for the use of such weapons. This legislation should require the disclosure of any holding and stockpiles of such weapons, and that the U.S. name the responsible officials in each country. It should cut through the vagueness and hypocrisy in most such reports, and deliberately shame the nations involved in the eyes of world opinion.

Further, the President should be required to notify the Congress in unclassified form of any major development in acquiring weapons of mass destruction by any country in the world within 60 days of the confirmation of such developments.

In the case of the sellers, it has become all too clear that even some of our closest allies will only act firmly to halt proliferation if we confront them with the constant threat of public exposure. The President should be required to provide a similar report any country, company, or individual selling weapons or technology which can be, or is, used to develop weapons of mass destruction. Once again, this report should name names. It should name the responsible official or officials in any seller country, the firms involved, and the individuals involved. Further, the President should be required to provide notification to the Congress of such sales within 30 days.

SANCTIONS AGAINST NATIONS ACQUIRING WEAPONS OF MASS DESTRUCTION

The second step should be to enforce more tangible sanctions. In the case of any Third World nation that is acquiring weapons of mass destruction, we should make it firmly clear that the U.S. will not extend any form of credit, aid, or technology transfer in any form to a nation that is acquiring such weapons for the first time, or adding to its present stockpile, for a period of five years after the most recent Presidential notification of such action, and will halt support to any international institution that will provide such aid.

Further, we should maintain a public international "blacklist" of the officials and individuals in a country that are involved in acquiring weapons of mass destruction, and permanently deny them visas to the U.S. This would brand those responsible for life, and end the kind of personal secrecy that is an essential part of today's efforts at proliferation.

SANCTIONS AGAINST NATIONS SELLING WEAPONS OF MASS DESTRUCTION

Finally, we must take equally firm action against the seller. We cannot shut off all trade with other nations for selling such weapons and technology, but we can target several key aspects of our relations. One is to deny technology transfer for all military technology. Another is to deny all forms of aid and credits, including both civil and military.

We can target the selling firms to force them to divest any holdings in the use and to prevent any goods containing any component they manufacture from being imported to the U.S. We can demand that they be blacklisted from any overseas contracts involving U.S. aid or international aid to which we contribute, and we can demand that this blacklisting be so broadly defined that it include the parent company, any company with any holding of any kind in the selling company, and any company with agreements for technical or financial cooperation on an international level.

We also should expand the international blacklist on entry to the U.S. to include sellers, and establish much harsher criminal penalties to any Americans that may violate U.S. law in these areas.

THE NEED TO BE FIRM WITH OUR FRIENDS AS WELL AS OUR ENEMIES

These measures may not prevent the proliferation of weapons of mass destruction, but they will make it far more difficult and put far more pressure on other nations to halt the new arms race towards weapons of mass destruction. They will establish a firm basis for seeking support for similar policies from our NATO allies, the PRC, and the Soviet bloc. They will greatly strengthen the many people in the Third World who fully recognize the dangers of such action, and that the Third World does not need to repeat the mistakes of the West and East.

We must, however, recognize that we cannot play favorites. We cannot condemn Iraq or the PRC and ignore the actions of Pakistan, Saudi Arabia, or Israel. We cannot deal in cliches or half truths, or excuse our own firms or the actions of our major Western allies like West Germany and Japan. We must act firmly and decisively, and leave no ambiguity or uncertainty on the part of other nations as to the firmness of our response. We cannot hope to be successful in safeguarding our most vital long term interests if we are willing to take short term advantage of failing to be honest about what friendly nations are doing.

THE AGENDA FOR ACTION

This is why I have cosponsored bills with Senator Dole and Senator Pell that will implement the program that I have just outlined, and take firm action to deal with the problem of the proliferation of weapons of mass destruction. It is also why I have taken the lead in making every new step towards the proliferation of weapons of mass destruction public. While I strongly support every effort to strengthen the current treaties regarding chemical and biological warfare, we must take far stronger action if we are to avoid replacing the nuclear arms race with the widespread use of chemical and biological weapons.

UNITED STATES INSTITUTE OF PEACE

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EXHIBIT NO. 4

Alan I. Edelman,
Counsel,
Permanent Subcommittee on Investigations,
United States Senate,
100 Russell Senate Office Building,
Washington, D.C. 20510

February 1 1989

Dear Alan,

Please find enclosed a short piece which we have just written on the problem of controlling chemical weapons which takes into account the reactions to our presentation at the symposium last week. It may be of interest to you.

With all good wishes,

Sincerely yours,

Raymond Cohen

Raymond Cohen

An independent institution established by Congress to strengthen the nation's capacity to promote peaceful resolution of international conflicts.

AN INTERNATIONAL AUTHORITY TO LIMIT CHEMICAL WEAPONS

Raymond Cohen and Robin Ranger

An urgent challenge for the Bush administration is to produce an effective US policy for halting the proliferation and use of chemical weapons (CW). Despite the best efforts of American policy-makers the US has failed to stop Iraq using CW (including nerve gas) against Iran and the Kurds, and Libya from building its Rabta CW plant, with West German and Japanese help. The recent Paris Conference of signatories of the 1925 Geneva Protocol refrained from imposing any penalties on Iraq for flagrantly violating the Protocol's ban on the first use of CW. The Conference also saw Arab states ominously linking their acceptance of the ban on CW possession under negotiation at Geneva to Israel's surrender of its nuclear weapons.

Under these circumstances the Executive and the Legislature must quickly find answers to two questions: First, how can existing and possible future limits on CW be enforced? Second, since a universal ban on CW manufacture is now unlikely to be achieved in the near future, what immediate international agreements can be reached on limiting CW?

A constructive answer to both questions would be for the US to propose the establishment, by governments committed to limiting CW, of an International Chemical Weapons Authority (ICWA). An ICWA would facilitate the imposition of penalties on states violating the Geneva Protocol and the provision of assistance to the victims of illegal CW use. The Authority would also limit CW proliferation by helping to identify both the suppliers and buyers of potential CW materials, so that such sales could be blocked.

At the heart of the ICWA concept is the strategy of *insurance*. In return for a commitment to refrain from acquiring chemical weapons, non-CW states joining the scheme would be assured of various benefits: In the event of a CW attack, confirmed by an automatic, independent investigation of the UN Secretary-General:

* The victim would be supplied with all necessary defensive supplies including antidotes, suiting and gas masks, and decontamination equipment. Teams of experts would be sent out at short notice to train the victim in their use.

* Fully equipped field hospitals and medical teams would also be rushed to the spot.

* Observers would be dispatched, with suitable publicity, to vulnerable centers of civilian population, to deter CW attack.

* Compensation would be provided to the victim. This would include financial aid, diplomatic support and military aid to balance any advantage which the CW user might have obtained by its use.

* For the first time since 1925, sanctions would be imposed on the government violating the Geneva Protocol.

The strategy of insurance would meet US objectives in controlling CW. It would provide nations with an incentive to renounce CW. It would deny potential CW users from obtaining any decisive benefit--they would be able to catch their victim off guard only once. Finally, it would actively deter the use of CW. A potential CW user would face not only the prospect of *negative* sanctions working to his direct detriment but also *positive* sanctions, working to the actual benefit of his opponent, who would enjoy the sympathy and support of ICWA.

But why, it will be objected, do we need yet another international agency? What would be gained by a formal body that could not be more readily obtained by informal contact or within the framework of the United Nations?

An ICWA would indeed build on the work of the informal 19-member Australian Group of governments in limiting CW proliferation by monitoring the spread of CW-making equipment and precursors, and harmonizing export controls. But a more formal body with a permanent secretariat would permit greater continuity and improve procedures for the collation and distribution of information. Nor would members be able to ignore its findings, as West Germany and Japan ignored US warnings in the Rabta case.

Moreover, by facilitating multilateral action by like-minded governments to limit CW, an ICWA would reduce the current burden the US bears of being the chief enforcer of CW limits. This burden will be increased if current Senate proposals to impose penalties on Iraq for its CW use and on companies supplying CW components become law. Senate proponents of such penalties have done a great service by pointing out that a continued US failure to enforce existing limits on CW would make meaningless both these limits and any future ones. But it would be easier on the US, as well as more effective, were an ICWA to provide the organizational framework within which governments committed to CW limits could act to enforce them.

ICWA could also be an important test case of Soviet-American and East-West cooperation in the area of arms control. Under Gorbachev the USSR has indicated an unprecedented interest in controlling the spread of CW. This has emerged in bilateral contacts, at the disarmament talks in Geneva and most recently at the Paris Conference. The Soviet Union has also displayed noteworthy restraint in declining to supply CW manufacturing capabilities to clients such as Libya and Syria.

Within the framework of an ICWA of *like-minded states*, then, collaboration would be relatively insulated from the kind of political complications inherent in broader forums such as the UN. Dissenting parties opposed to CW limits would be unable to disrupt the constructive work of the organization, though they could hardly ignore its practical effects. Functional bodies, underpinned by common interest, tend to generate habits of cooperation not achievable elsewhere. Once an ICWA were in place a positive momentum of practical cooperation might be generated with useful implications not only for the control of CW but also for East-West relations and other areas of arms control.

An ICWA would also remedy the fatal flaw in the draft Convention banning CW manufacture and stockpiling: the lack of any provisions to enforce compliance with its limits. This flaw makes the CW Convention's controversial verification provisions essentially irrelevant, because they could be violated with impunity.

An International Chemical Weapons Authority would thus be an effective means of achieving US arms control objectives. In the short term, the Authority would facilitate US collaboration with like-minded governments to reverse the rapid erosion of existing limits on CW proliferation and use. In the longer term, the Authority could similarly facilitate the enforcement of any future limits on CW, if these were achieved. Most important, it would provide Third World states, tempted--or alarmed--by the Iraqi precedent, with a realistic alternative to going it alone.

Raymond Cohen teaches at the Hebrew University of Jerusalem. Robin Ranger is an Adjunct Scholar at the Heritage Foundation. Both are currently Peace Fellows in the Jennings Randolph Program of the United States Institute of Peace. The views expressed in this article are those of the authors alone and do not necessarily represent those of the Institute.

EXHIBIT NO. 5

STATEMENT OF
ROBERT E. STEVENSON
CHAIRMAN OF THE BIOTECHNOLOGY TECHNICAL ADVISORY COMMITTEE
OF THE U.S. DEPARTMENT OF COMMERCE
AND
RILEY D. HOUSEWRIGHT
FORMER SCIENTIFIC DIRECTOR, FORT DETRICK, MD
BEFORE THE
U.S. SENATE GOVERNMENTAL AFFAIRS COMMITTEE AND THE
U.S. SENATE PERMANENT SUBCOMMITTEE ON INVESTIGATIONS
HEARING ON
THE GLOBAL SPREAD OF CHEMICAL AND BIOLOGICAL WEAPONS:
ASSESSING CHALLENGES AND RESPONSES
February 9, 1989

Periodically, public and Congressional attention is focused on the possibilities of using chemical and biological weapons for warfare or terrorism.

While the United States had renounced use of biological agents and has destroyed what it made in the past, other countries have not taken a strong position on this issue, leading us to believe that, for some, it remains an option.

Options, however, require more than wishful thinking, and the ability for a country or terrorist group to put together and deliver effective biological weaponry is not a trivial enterprise.

It is much easier to buy arms and explosives and to produce chemical warfare agents than it is to do comparable harm with biological systems.

Much ado has been raised about the shipment of microbiological cultures to other countries. Banning United States exports of these would be an exercise in futility, in our opinion, because several hundred established culture collections in all parts of the world have similar or identical materials publicly available. The adverse consequence to science of making such materials hard to get, for legitimate purposes, would be worse than the probable dangers, in our estimation.

The level at which surveillance and possible control can be exercised is in the scale-up of culture production.

Sizeable quantities, in excess of 100's of liters, would have to be produced in order to purify and concentrate materials for weapons production. Not only would the fermentation (mass production) require sophisticated, contained equipment, but also the purification and packaging processes would be dangerous without elaborate precautions for sterility and personnel protection. Sales of these kinds of equipment can be monitored and controlled, and surveillance activities in suspect areas can be directed toward discovering and watching operations in plants equipped in these ways.

Currently, the Biotechnology Technical Advisory Committee of the Department of Commerce has been charged with some oversight in these areas. The Committee has been constrained, however, by its inability to pay travel funds for critical members, lack of meaningful task assignments, inaction on its recommendations, and reluctance of other agencies/departments of the Executive Branch to cooperate in the development of a meaningful agenda.

It is apparent to those of us on the Committee, or knowledgeable in biotechnology, that the United States, while advanced in resources and technology, is not unique anymore, nor in some cases leading the pack.

The Japanese have an impressive lead in patents in fermentation processes and products, and the Europeans and Scandinavians have well-designed and highly price-competitive fermentation equipment.

Thus, the objectives of several current bills in the legislative hoppers, while laudable, may be difficult or impossible to reach by export controls on United States goods and services.

Crafting of effective legislation will require very careful consideration of input from expert sources and, perhaps, some control measures different from those currently envisioned.

Various professional groups are available to assist when asked, and Congress is ready to use them.

EXHIBIT NO. 6

KOREAN PEOPLE'S ARMY NBC CAPABILITIES

LATEST REVISION: 2/5/89

Joseph S. Bermudez Jr.
P.O. Box 471
Woodmere, New York 11598
(516) 374-9924

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Author's Note

Reader's are cautioned that due to the extremely closed nature of society within the Democratic People's Republic of Korea accuracy in any work dealing with the country or its armed forces, especially in the field of NBC capabilities, is a matter of relatives. A certain amount of the information in this study will inevitably be incorrect. Other material may be misinformation, disseminated by interested parties to serve their own purposes. The catch words "probably", "estimated", "are believed to" and "apparently" must unfortunately appear frequently. Nonetheless, it is believed that this study provides a new and unique look into the subject and is the best unclassified compilation of information presently available. It is the author's hope that this paper provide a firm foundation upon which further study of the subject may be developed.

KOREAN PEOPLE'S ARMY
NBC WARFARE CAPABILITIES

By Joseph S. Bermudez Jr.

> *"Poison Gas is employed to destroy the fighting power of the enemy army by the deprivation, either temporary or permanent, of the normal function of a part of the physiological structure of men or beasts. Again, by making the enemy use protective equipment against poison gas, the combat range of the enemy army is reduced or curtailed, and their combat strength is weakened."* - KPA Chemical Warfare manual, 1947[1]

Introduction

As is indicated by the above quote the Korean People's Army (KPA) has realized the importance of, and has been actively concerned about, the effects of nuclear-biological-chemical (NBC) warfare on the battlefield since its creation.

Fortunately, for both the United Nations Command (UNC) forces which were to subsequently fight in Korea, and one must assume the KPA itself, the KPA was incapable of developing this awareness into combat potential during the 'Fatherland Liberation War' (Korean Conflict). The KPA today, however, not only possesses the means to indigenously produce and effectively employ significant quantities and varieties of chemical agents; it has developed a fledgling biological warfare capability and possesses the 'will' to effect the tactical 'first use' of chemical and biological weapons.

1946 to 1960 - Birth of the Chemical Defense Force

The first known references to Democratic People's Republic of Korea (DPRK) interest in NBC warfare appear in 1946, with the establishment of the Pyongyang Institute and the Central Security School. Both these schools offered chemical defense courses within the officer candidate curriculum. These courses, which were taught by Soviet advisors and used translated Soviet manuals, discussed in detail the characteristics (physical and chemical), employment in combat, medical treatment of, protection from, and decontamination once exposed to: "...Yperite, ...Lewisite, ...Adamsite, ...Hydrocyanic Acid, ...Phosgene, and

...Diphosgene".[2] It was these early courses and Soviet World War II doctrine which provided the foundation upon which the KPA developed its current NBC doctrine.

Despite this interest in chemical warfare, the actual establishment of chemical defense units within KPA combat echelons didn't commence until after the 'Fatherland Liberation War', and it was precipitated by two major factors. The first, was the KPA and 'Chinese People's Volunteers' (CPV) belief that the U.S. had employed chemical and biological weapons against their units in Korea and against villages within the PRC itself.[3] The second factor was the U.S. threat to employ atomic weapons against the People's Republic of China (PRC) proper and the CPV in Korea to end the war.[4] Both factors have had a truly profound effect upon both the DPRK and PRC, and have pervaded their thoughts on NBC warfare ever since.[5] The effect of these fears on the KPA was that in late 1954, the Ministry of National Defense issued orders calling for the complete reorganization of the KPA. Included within this reorganization was the establishment of a Chemical Department within the General Staff Department and chemical defense units organic to the following combat echelons:

- Chemical defense platoon within infantry regiments.
- Chemical defense company within infantry divisions.
- Chemical defense unit (of reinforced company size) within infantry corps.
- Chemical defense battalion organic to the I and II Army Groups.[6]

Although these units were designated as either 'Chemical' or 'Chemical Defense' troops, their responsibilities also included protection against nuclear and biological weapons. It was obvious from the onset that these units could not be fully manned, not to mentioned equipped, and would remain essentially 'paper' units for some time. To compensate for these shortages the few chemical warfare qualified personnel that were available, were assigned to the headquarters staffs of the various combat units. Priority for the assignment of these personnel went first to the I and II Army Groups, and then to the 'Forward' Corps and divisions.[7] However, the following year, in late 1955 the KPA initiated the a series of national atomic defense exercises for units within 'Rear Area' corps, for example:[8]

- September 1955, units of the II Corps participated in an atomic maneuver entitled "Offensive and Defensive Infantry Corps Operations in Atomic Warfare".[9]

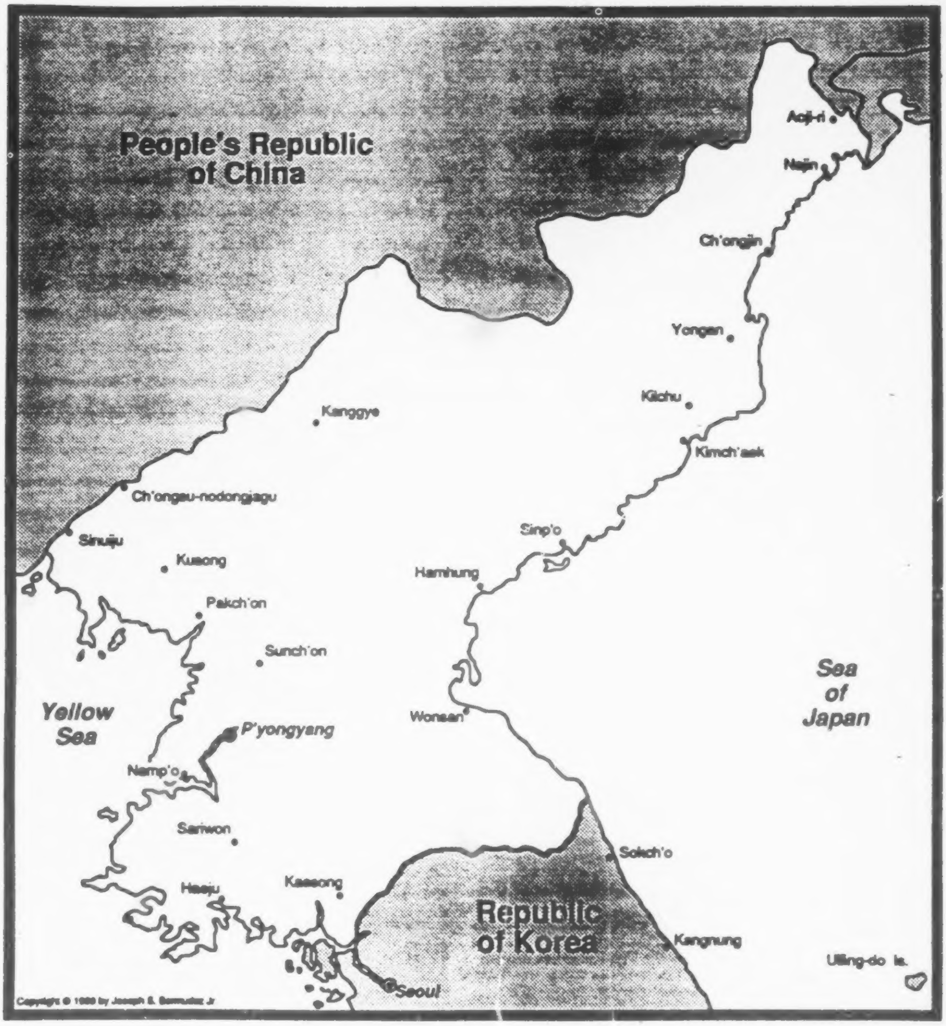
- May 1956, the VII Corps was relieved by the III Corps and moved to the vicinity of Sariwon. Here the Corps' 3rd [*Seoul* - *Guards*] Infantry Division, 7th Infantry and 37th Infantry Divisions underwent atomic training.[10]
- December 1956, elements of the IV Corps (10th [*Guards*] Infantry Division) and II Corps (2nd and 27th Infantry Divisions) participated in an atomic winter maneuver. After the exercise, the corps returned to the Wonsan area and its coastal defense mission.[11]

Although the exact date is unknown, by January 1958 the DPRK, possibly with PRC assistance, had established the KPA's "Atomic Weapons Training Center" located near Kilchu, on the east coast north of Kimch'aek (Figure 1. Map of the DPRK).[12]

There is some evidence to suggest that during the late-1950s both the Soviet Union and PRC provided the DPRK with limited quantities of World War II chemical/biological technology, protective gear and possibly agents. The majority of these transfers came from pre World War II Soviet inventory and captured Japanese and Nationalist Chinese stocks. The possibility also exists that small numbers of Korean nationals had gained limited chemical/biological warfare experience during World War II. This experience being gained either with Soviet forces, or through involvement with the Japanese chemical/biological warfare experiments and operations conducted by Lieutenant General Shiro Ishii's Unit #731 in Manchuria and Jiro Wakamatsu's Unit #100.[13]

1960 to 1970 - The Early Years

By 1962 the KPA had undergone another reorganization and the NBC organization and status of chemical defense training had improved significantly. These improvements had allowed for the actual formation of chemical defense units based upon the 1954 reorganization program. Following the precedent set during the assignment of chemical defense qualified personnel, priority for the establishment of the chemical defense units went first to the army groups and then to the 'Forward' Corps and divisions. Not only were the majority of these newly established units still understrength, but there was also an extreme shortage of NBC equipment throughout the entire KPA. Quantities on hand were insufficient to permit complete issue to even 'Forward' units. In fact, there were numerous cases among these units where only one or two gas masks and other items of protective equipment were available to an entire infantry company.[14]


People's Republic of China
Aoji-ri
Najin
Ch'ongjin
Yongan
Kilchu
Kanggye
Kimch'aek
Ch'ongsu-nodongjagu
Sinuiju
Kusong
Sinp'o
Hamhung
Pakch'on
Sunch'on
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Yellow Sea
P'yongyang
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Sariwon
Sokch'o
Haeju
Kaesong
Republic of Korea
Kangnung
Ulling-do Is.
Seoul
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FIGURE 1
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

The limited NBC equipment available at this time represented a mediocre collection of odds and ends from numerous sources, with little standardization. The majority were of Soviet manufacture, although there were items from the United States, Nationalist China, and Japan. Common mask types included "...the Japanese Type-93.3 and -99; Chinese Nationalist Type-24; and the Soviet O-8 and ShM-1".[15] Protective clothing was also of limited supply and consisted primarily of Soviet manufacture; although there were a number of World War II Japanese decontamination suits (i.e. Type-90) available.[16] The KPA inventory also included capes, groundsheets, aprons, coveralls, trousers, boots and gloves. The majority of these items were manufactured from paper, oil-skin, rubber, or rubberized fabric. Detection and decontamination equipment, also of Soviet manufacture, was available in only token quantities, and then primarily for training purposes.[17]

Along with the general reorganization and expansion of the KPA during this period, all civil defense functions were consolidated within the Ministry of Internal Affairs' Central Civil Air Defense Department. This department was organized into nine provincial offices and a number special civil air defense districts.[18] Included within the missions of the Central Civil Air Defense Department were the identification and location of NBC attacks. In the case of a nuclear attack local Civil Air Defense Teams would report its azimuth and elevation from their position, elevation of the resulting cloud, width of the 'fireball'/cloud and weather conditions. In the case of a chemical/biological attack they would report similar location and weather information, but would also report any symptoms among the civilian population and attempt to identify the causing agent.

Efforts to develop both its indigenous chemical industry and a chemical weapon production capability,which began during the first 'Five-Year Plan' (1957-1961), apparently encountered greater difficulty then anticipated. As a result, in 1964 the DPRK contracted with Japan to import small quantities of Japanese 'agro-chemicals'. This was to be followed by an additional small purchase during 1966. These purchases were not only of assistance to the DPRK's economy and agriculture, but to the slowly developing chemical industry, with the limited 'technology transfer' that such purchases provided. These efforts to develop an indigenous chemical industry were dealt a staggering blow when the Soviet Union suspended military and economic aid between 1962-1966. It is believed that it was during this period of Soviet aid suspension that the DPRK and the PRC developed closer relations which benefitted the KPA with the transfer of chemical agent technology, PRC reversed engineered Soviet equipment and cooperation in the field of chemical warfare studies.

Soviet aid was resumed during 1966, and during the late-1960s and early 1970s the Soviet Union is believed to have provided, among other things, technical assistance to the DPRK's fledgling chemical industry, advanced chemical defense training and small quantities of chemical agents and munitions. This resumption of Soviet aid was accompanied by a general reorganization within the KPA, and an increase in chemical defense awareness. Training emphasis was placed on conducting combat operations under simulated conditions of NBC attack. Although chemical defense units, organized and equipped for reconnaissance and decontamination, were now accepted as organic elements within the 'Forward' Corps and the III Corps (surrounding the capital city of P'yongyang), these units were considered as still being understrength and under-equipped. While, the 'Rear Area' corps exhibited an almost complete absence of NBC assets.

Although initially introduced during the 'Fatherland Liberation War', as a means of protection from UNC air and artillery attack, the policy of providing extensive networks of 'hardened' underground facilities for both the military and industry had fallen into disuse during the immediate post-war years.[19] However, in an address at a rally held in Sinuiju on September 9, 1964 Kim Il-sung stated:

> "From now on, all new major plants must be built underground instead of on the surface."[20]

By the late-1960s, this policy had resulted in the DPRK being generally well prepared for passive chemical defense.[21] The extent to which these facilities provided adequate defense against the effects of a nuclear attack, however, is unknown.[22] The DPRK has continued this policy to the point that today it is probably the world's most heavily fortified country.

It is believed that it was during the late-1960s that the DPRK's chemical industry actually began the production, on an experimental basis, of offensive chemical agents. The first agents produced probably consisted of the mustard family and conceivably Tabun.

1970 to Early 1980s - Standardization and Expansion

By 1970 NBC training, within the KPA, appeared to be in full swing, with courses of instruction being standardized and now required for all personnel. Although, the KPA would closely followed Soviet NBC doctrine, which stressed both offensive and defensive capabilities, throughout the 1970s it is apparent that training emphasized defensive protective operations in anticipation of any possible ROK/U.S. NBC attacks.[23] It also included the use of "...smoke screens, [and] flamethrowers using toxic ingredients...".[24] Individual protection equipment was now standardized on the Soviet-manufactured ShM-1 protective mask and an indigenously produced protective ground cloth/tarp. A significant enough inventory of these items now allowed for their issue to all active duty personnel.[25] The Ministry of National Defense (today the Ministry of People's Armed Forces - MPAF) established KPA individual NBC warfare training requirements at 40 hours per year, divided between lectures and practical exercises. Lectures concentrated on individual familiarization with the effects produced by a nuclear explosion, the reactions caused by chemical and biological agents, in addition to the structure, proper use and maintenance of the protective mask. Noteworthy of this increased training emphasis in NBC warfare, were references to troops conducting 'simulations' under various NBC "conditions".[26] The purpose of these exercises was to "...teach the proper responses to given [NBC] situations...".[27]

NBC training was now also extended to the DPRK's educational system and paramilitary reserve forces. Training in secondary school totaled 6 hours per week, or about 240 hours per year. 'Red Youth Guard' members received NBC instruction both within schools and while conducting their three months - off campus - field training exercises during their senior year.[28] With 'Red Youth Guard' members of the Hungnam Chemical Engineering College apparently providing NBC trained personnel when mobilized.[29] Basic training for 'Worker Peasant Red Guard' personnel included a section on NBC defense.[30] While members of the 'Paramilitary Training Units' received extensive training in "...marching exercises, ambush and counter-ambush exercises, and counter-chemical exercises." These "...chemical warfare maneuvers include the donning of gas masks and negotiation of contaminated areas marked by small red flags."[31]

During the late-1970s, possibly as a result of the slow growth within the DPRK's chemical industry, the DPRK formalized trade agreements with Japan for the further importation of 'agro-chemicals' at an irregular, yet increasing rate. Besides the 'agro-chemicals', these imports now included significant quantities of industrial chemicals. Total imports included: 1.6 million tonnes in 1976, 2.0 in 1977, 1.8 in 1978 and 3.1 million tonnes during 1979. Although the vast majority of these imports were utilized for legitimate purposes, it is believed that small quantities were siphoned off for use within the DPRK's chemical weapons programs. In accessing KPA offensive chemical warfare capabilities in May 1979, the Defense Intelligence Agency stated:

> "Until the North Koreans reach a level of self-sufficiency in science and technology .. they will continue looking to their Communist allies to some degree for chemical warfare needs. North Korea has developed a protective chemical warfare capability; thus, the next logical step is to pursue the development of an offensive capability to offset any NBC threat from its enemies. [Since] ... the North Koreans probably base their chemical warfare doctrine primarily on the Soviet chemical warfare model, the research and development of offensive weapons is extremely likely in the near future."[32]

Early 1980s to Present - Offensive Capability

Available evidence suggests that the "near future" occurred during the early-1980s, by which time the DPRK had initiated the bulk production and deployment of chemical munitions, including nerve gases.[33] At the 7th ROK/U.S. Military Committee Meeting, in May 1985, a senior official stated that "...both sides shared the view that it is quite likely that north Korea would use its chemical weapons in view of Pyongyang's current war tactics", and that the DPRK had "stockpiled considerable amounts of chemical weapons".[34] On 25 February 1986 General John A. Wickham Jr., then Chief of Staff, United States Army in testimony before a Subcommittee of the Committee on Appropriations, House of Representatives, confirmed that the DPRK:

> "... is producing their own chemical weapons and stockpiling lethal chemical offensive weapons"[35]

In May 1986, ROK intelligence sources "confirmed that 180-250 tons of chemical and biological munitions are stored in some 170 tunnels just north of the military demarcation line [DMZ]".[36] The DPRK quickly denied these reports stating that "It is not us, but the U.S. imperialists and the South Korean puppets who are massively producing and stockpiling chemical and germ weapons and stepping up preparations for chemical and germ warfare".[37] Although the DPRK is not presently believed to be entirely self-sufficient in the production of chemical agents (it apparently still imports a number of precursors), production is increasing and is presently believed to be occurring at 8 locations (up from the previously estimated 5-6 locations in 1986).[38] Since the DPRK's chemical industry is presently centered around the 12 industrial cites of: Aoji-ri, Ch'ongjin, Ch'ongsu-nodongjagu, Hamhung, Hungnam, Kusong, Namp'o, Pakch'on, P'yongyang, Sinuiju, Sunch'on, and Yongan (see Figure 1. Map of the

DPRK); it is probable that the production of chemical munitions is also within several of these cities.[39] Chemical agents currently known to be in KPA inventory include, but are not necessarily limited to: the Sarin (GB)-family of nerve gases, Tabun (GA), Phosgene (CX), Adamsite (DM), the mustard gas-family (probably the higher mustard bis[2-chloroethylthioethyl] ether [agent T] due to its cold weather characteristics), and 'blood agents' such as Hydrogen Cyanide.[40]

Noteworthy in regards to this attainment of an indigenous capability is that, this period also coincides with continued, yet spasmatic, increase of chemical imports from Japan, with 4.0 million tonnes in 1980, 4.6 in 1981, 3.7 in 1982, 1.9 in 1983 and .2 in 1984. These imports now included significant quantities of organic chlorine and organic phosphorous insecticides, which could readily be utilized in the production of blood and nerve agents. Once again, although the majority of these chemicals were utilized for legitimate purposes, it is highly probable that significant quantities found their way into the DPRK's chemical weapons program. A few of the DPRK trading companies believed to be involved in importing chemicals include: Chosen Hwahak Jepoom, Chosen Yongaksan, Chosen Bonghwa, and Chosen Namheung. The DPRK attainment of offensive chemical weapons capability is believed to have provided added impetus to the the October 1988 Japanese Ministry of International Trade and Industry ban on the export of chemicals on the 'Australian Group' control list and other materials that could be easily employed to produce chemical weapons (see Appendix A).[41]

This time period also witnessed dramatically improved DPRK-Soviet relations, which had been quite cool during the 1970s and early 1980s. A significant part of these new relations was a 1985 DPRK-Soviet agreement which provided for the Soviet modernization of the DPRK's armed forces, in exchange for port privileges and limited overflight rights.[42] This Soviet aid has apparently included some cooperation on defensive NBC operations. For example, during 18-23 May 1987 a high-ranking Soviet military delegation, led by General Vladimir Govorov, Deputy Minister of Defense and Army Civil Defense Commander, made a 6-day official visit to the DPRK. The purpose of his visit was to discuss matters concerning the increase of Soviet military aid to P'yongyang and the strengthening of military ties between the two countries, especially in the civil defense field.[43] However, Soviet assistance is not currently believed to extend into the area of offensive chemical or biological weapons. Press reports indicating that this revival of DPRK-Soviet relations has led the Soviets to provide "toxic gas bombs ... filled with ... Sarin", cannot be confirmed and remain suspect.[44]

Today's chemical warfare training standards are based upon those established during the early-mid 1970s. The differences appear to be an increased number of hours, more realistic training from squad level up, training in offensive operations, and the quantity and quality of available equipment. KPA doctrine calls for all active and paramilitary reserve personnel receive chemical warfare training both through lectures and practical exercises at least 4-5 times a year. Such activities include practice in individual protective procedures; identifying chemical and biological agents; first aid procedures; actions in contaminated areas; protective clothing; protection of food, water, and general items; decontamination of personnel and equipment; and identification of chemical warfare equipment of foreign countries.[45] Personnel assigned to chemical defense units receive 398 hours of highly specialized training in NBC reconnaissance and decontamination operations during their 760 hours of branch training.[46] During such training troops have been known to spend up to 10 days completely sealed within tunnel complexes for NBC training. The KPA is known to employ, as do the Soviets, weakened chemical agents and simulator agents during major training exercises.

Individual chemical warfare equipment presently includes: the **ShM** series of masks, and possibly the PRC **Type-65** in limited numbers; the **OP-1** protective suit (although a small number of a new PRC suit may also be in service)[47]; the indigenously produced disposable ground cloth/tarp (a 150 cm by 150 cm piece of oil impregnated heavy paper used to cover an individual during a chemical attack); individual treatment/decontamination kits similar to the Soviet **MSP-18** and **IPP**.[48] Within chemical reconnaissance units, agent detection and identification kits such as the **PKhR** are standard equipment.[49] While other major items of decontamination equipment include: **ADM-48D**, **AGV-3**, **ARS-12/14**, **BU-4**, **DDA-53A**, **DDP**, and **RDP-3**.[50] The KPA is not known to employ specialized NBC reconnaissance vehicles such as the Soviet **BRDM-1RKh** or **-2RKh**, but instead mounts detection and marking equipment on the **Sungri-58/61** series of trucks.

In order to conserve chemical warfare equipment stocks only a small number of items are actually distributed to the troops. Two protective masks are generally available for each KPA soldier; one for training and the other is in storage for wartime usage. Each soldier is also issued two pairs of protective socks (one pair for training, one pair for wartime), an individual treatment kit (one per squad during peacetime) containing two antidotes for blister agents, one each for choking and nerve agents, and two atropine injectors (wartime issue).[51] Chemical defense personnel are also issued one apron and rubber chemical warfare suit.[52] Chemical warfare equipment and munitions are either manufactured domestically or are imported from the Soviet Union or the PRC. Imported items include: detectors, measuring instruments, and decontamination equipment. Items manufactured within the DPRK include: protective masks, socks, gloves, miscellaneous individual items, agents and munitions. Chemical/biological munitions are believed to to be available for all artillery and artillery rocket systems greater than 122 mm; warheads for its **FROG-5** (Soviet: **Luna-2**) tactical ballistic rockets and **SS-1c SCUD B** (Soviet: **R-17E**) battlefield support missiles; and air dropped ordnance.

Biological Capabilities

In general offensive biological warfare has not received the attention that chemical warfare has. This is probably due to the DPRK's limitations in bio-technology and the realization that once employed there is almost no control over such weapons. Additionally the KPA must realize, that in the end, biological warfare could be more detrimental to the KPA, then to the ROK or U.S., due to the KPA's very limited medical capabilities. However, for exactly the same reason defensive biological warfare has received significant attention. This is compounded by the DPRK belief that the U.S. employed biological weapons during the "Fatherland Liberation War"; and the fear that the U.S. would not hesitate to do so in a future conflict.[53]

While the Soviet Union and the PRC have definitely provided the DPRK with chemical agents, they are not believed to have provide any direct assistance in the development of biological weapons. Such capabilities are believed to have been developed indigenously. DPRK biological warfare research is believed to have begun sometime during the mid-1960s and to have focused on 10 different strains of bacteria including: Anthrax, Cholera, Bubonic Plague, Smallpox and Yellow Fever. At present, it is believed that the DPRK has not employed genetic engineering or advanced bio-technology to develop these bacteria.[54] The primary facilities engaged in this research are the "National Defense Research Institute" and "Medical Academy". However, the exact location of these facilities is presently unknown.

It is not known when the DPRK actually initiated the production of biological agents for offensive employment. However, such a capability presently exists and is believed to have existed since at least the early 1980s and possibly earlier.[55] Limited production of biological agents may be conducted at the "National Defense Research Institute and Medical Academy", however, it is more probable that there exists separate production and research facilities.

Nuclear Capabilities

The first known references to any nuclear related activity within the DPRK dates to 1947 when the Soviets, with assistance from a Dr. Chao Yang, conducted a survey of the DPRK's monazite mines.[56] (The thorium and uranium-oxide content of monazite were key raw materials then used by the Soviets in the production of nuclear energy. Thorium-oxide could be converted to a fissionable substance by the use of uranium in an "atomic pile").[57] Beginning shortly thereafter, the Soviets initiated the expansion of DPRK monazite mines and the export to the Soviet Union of large quantities of monazite.[58] This monazite production was interrupted by the Korean Conflict, but is believed to have resumed shortly after the signing of 1953 Truce Agreement. The next known reference to nuclear activity dates to 1952. When the PRC reportedly sent a leading scientist - Wang Ganchang - to the DPRK on a secret mission to "collect radioactive material" (Wang would later become director of a technological committee of the Ninth Academy and was instrumental in the development of the PRC's atomic bomb).[59] Little else is known concerning any other nuclear activity within the DPRK, until mid-1980s and the dramatic revival in DPRK-Soviet relations. However, it is probable that a small number of DPRK nuclear scientists were educated within the PRC and Soviet Union; and that the PRC has assisted in locating and mining radioactive materials within the DPRK.

Exactly when the DPRK nuclear program was established is unknown. However, by the mid-1980s the DPRK had taken delivery of a small 4-megawatt research reactor from the Soviet Union, and was in the process of constructing a larger 30-megawatt reactor that uses Uranium and Graphite.[60] The later project was believed to have been initiated without the assistance of other governments.[61] During the December 1985 visit to Moscow, of then Premier of the DPRK, Kang Song-san, the Soviet Union agreed to construct a nuclear powerplant within the DPRK. In return for this assistance the DPRK agreed to sign the 1968 Nuclear Non-Proliferation Act.[62] This powerplant, with a capacity of approximately 1.76 million kw, will be the first of its kind in the DPRK. It is scheduled to be constructed with Soviet assistance during the next five years, as part of the Soviets' 12th Five-Year Economic Plan period.[63] The details of the 1985 DPRK-Soviet agreement was apparently secret as U.S. Department of Defense sources indicated two months later, February 1986, that "...we don't see evidence of nuclear capability, but we look very carefully to find out about that."[64]

To facilitate the introduction of nuclear power the DPRK's Administrative Council (Kim Il-sung's cabinet) was reorganized, on December 29, 1986, with the creation of a Nuclear Power Industry Ministry, under Choe Hak-gun.[65] Since his appointment as Minister of the Nuclear

Power Industry Ministry, Choe Hak-gun and his deputy, So Jong-ju, have been actively engaged in the establishment of international nuclear connections. Making trips to the Soviet Union, Switzerland and Austria (to participate in the 31st general meeting of the International Nuclear Power Organization).[66] By October 1987 considerable progress had been made in drawing up designs and in conducting various exploratory tests for the construction of the plant.[67]

While the acquisition of a nuclear power generating capability neither indicates a desire, nor capability, to acquire or produce nuclear weapons. It is a significant step in that direction, and any technology transfer associated with such a project could significantly ease the burden of any future DPRK efforts to develop nuclear weapons. Given the: current DPRK leadership's memories of the U.S. threats to use such weapons to end the Korean Conflict; the probable U.S. deployment of nuclear weapons on the Korean Peninsula; fear that the ROK could develop its' considerable civilian nuclear industry into a nuclear weapons program; and the considerable efforts already expended to develop chemical and biological warfare capabilities, it must be assumed that the DPRK will endeavor to develop an indigenous capability to produce nuclear weapons. Furthermore, due to the highly unstable nature of the DPRK leadership, it is extremely unlikely that the Soviets will assist in such a weapons program. Thus a DPRK nuclear weapons capability is not likely to be achieved until after the year 2000.

Relative Importance of the Chemical Warfare Program

The relative importance of the chemical warfare program (which includes biologicals) to the DPRK, is difficult to express. Although the DPRK is a industrialized nation, its industry is neither, modern nor, of a high quality. While education is highly stressed, its quality is low, and operates under the burden of being subordinate to the intense study (approaching worship) of Kim Il-sung and his heir-apparent Kim Jong-Il. Yet, in spite of all this, there are a small number of high quality industrial facilities and an equally small number of highly educated, skilled and dedicated scientists, engineers and technically oriented professionals. In a nation such as the DPRK, these limited resources and professionals are in the highest demand by all sectors of society. Yet, given the DPRK's long term commitments to both its chemical warfare missile development programs; it appears that the majority of these high quality resources and skilled professional are allocated here. That the DPRK has made such conscious decisions and allocated such scarce resources (esp. foreign currency), at the detriment of society as a whole, is an extremely significant indicator of the importance attached to these programs.

Organization of the Chemical Defense Force[68]

The current strength and organization of the KPA's chemical defense force is unclear, however, judging from what little information is available and from known KPA organizational structures, some preliminary assessments are possible (Figure 2. Chemical Warfare Force [Postulated]). The estimated T/O&E strength of this force is 11,000. However, given the realities of manpower requirements, the actual number of deployed personnel is, in all probability, closer to 9,900 or 1% of the KPA's present strength (Figure 3. Chemical Warfare Force - Strength Estimate). This force is administered at General Staff Department (i.e. GHQ) level by the Chief of the Chemical Department.

The Chemical department is believed to be organized into a command element (7 officers) and four subordinate bureaux: Ordnance, Schools, Research & Industry and Chemical (Figure 4. Chemical Department). The Ordnance Bureau provides for the acquisition, evaluation and storage of chemical weapons and equipment. It is organized into a command element, staff and at least 10 depots. These depots are believed to be located one apiece within each of the 9 army corps plus 1 central depot (possibly located in the III Corps). While, the Ordnance Bureau is responsible for the administrative, maintenance and technical operation of these depots; the Political Security Department, through the offices of the Political Security Bureau, is presumably tasked with custodial and security responsibilities for all chemical and biological munitions. The Political Security Bureau is presumably also responsible for the security of production facilities. The Schools Bureau is responsible for the organization and supervision of troop training and the tactical training of subordinate chemical defense units and support personnel. It is organized into a command element, chemical warfare school, officer candidate school and a training regiment. It is believed that the Hungnam Chemical Engineering College functions both as the chemical warfare branch and officer candidate schools.[69] The Research & Industry Bureau provides coordination and guidance between the DPRK's chemical industry and research facilities, and the Chemical Department. It is probably organized into a staff element and three departments (chemical, biological and nuclear); with the departments themselves being organized into research and industry sections. The Chemical Bureau is responsible for: the preparation of doctrine; mobilization readiness and tactical preparedness of chemical defense units; development of plans for the tactical and strategic employment of chemical weapons and chemical defense units; the provision of advice to the Chief of the General Staff; and the provision of administrative and specialized technical support to all

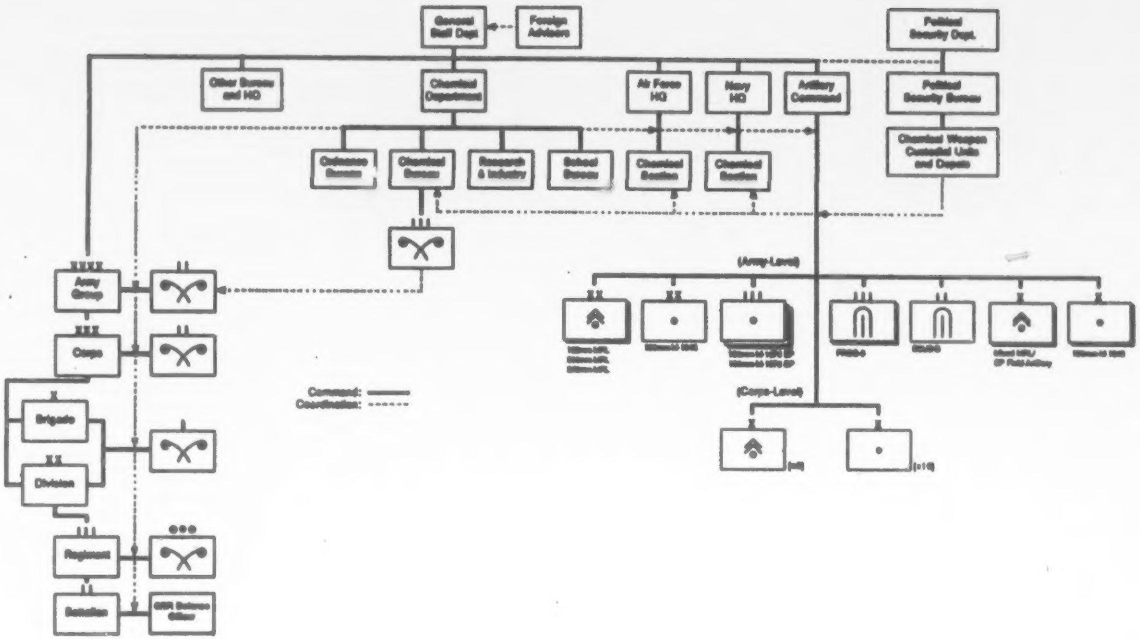
General Staff Dept.
Foreign Advisors
Other Bureau and HQ
Chemical Department
Air Force HQ
Navy HQ
Artillery Command
Political Security Dept.
Political Security Bureau
Chemical Weapon Custodial Units and Depots
Ordnance Bureau
Chemical Bureau
Research & Industry
School Bureau
Chemical Section
Chemical Section
(Army-Level)
(Corps-Level)
Army Group
Corps
Brigade
Division
Regiment
Battalion
CBR Defense Officer
Command:
Coordination:

FIGURE 2
KPA CHEMICAL WARFARE FORCE [POSTULATED]
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Echelon	No. of Units	T/O&E Strength	T/O&E Total	Actual Strength Estimate (90%)
Chemical Department				
Command		7	7	7
Ordnance Bureau		518	518	466
School Bureau		500	500	450
Research & Industry		100	100	90
Chemical Bureau				
Command		6	6	6
HQ		69	69	62
Ind. Regiment	1	700	700	630
Repair Battalion	1	300	300	270
Corps				
Battalion	9	281	2529	2276
Divisions				
Company	40	87	3480	3132
Brigades/Regiments				
Platoon	68	27	1836	1652
Political Security Bureau				
Misc. CW Units		500	500	450
Air Force Units				
Misc. CW Units		300	300	270
Navy Units				
Misc. CW Units		150	150	135
TOTAL			10,995	9,896

FIGURE 3
KPA CHEMICAL WARFARE FORCE:
STRENGTH ESTIMATE

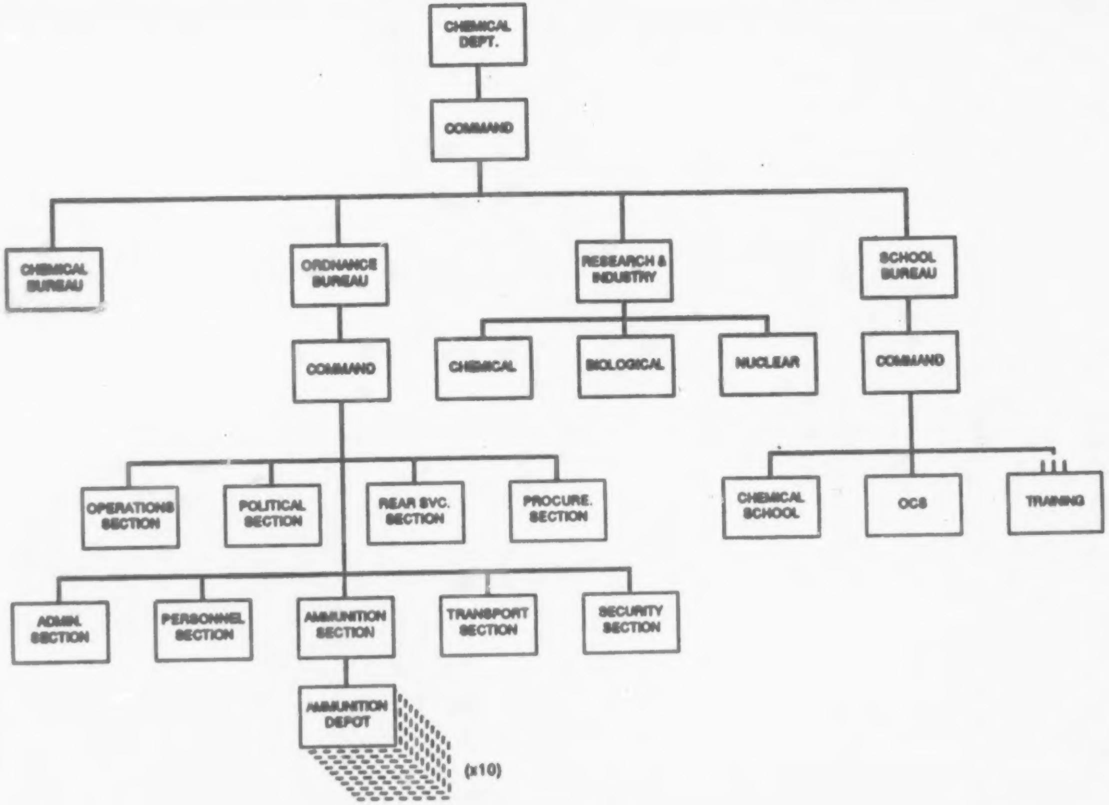
CHEMICAL DEPT.
COMMAND
CHEMICAL BUREAU
ORDNANCE BUREAU
RESEARCH & INDUSTRY
SCHOOL BUREAU
COMMAND
CHEMICAL
BIOLOGICAL
NUCLEAR
COMMAND
OPERATIONS SECTION
POLITICAL SECTION
REAR SVC. SECTION
PROCURE. SECTION
CHEMICAL SCHOOL
OCS
TRAINING
ADMIN. SECTION
PERSONNEL SECTION
AMMUNITION SECTION
TRANSPORT SECTION
SECURITY SECTION
AMMUNITION DEPOT
(x10)

FIGURE 4
KPA CHEMICAL DEPARTMENT

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chemical defense units. This bureau is apparently organized into a command element, headquarters, chemical defense maintenance battalion and a chemical defense regiment (Figure 5. Chemical Bureau). The chemical defense maintenance battalion has an estimated personnel strength of 300 and is responsible for the repair and heavy maintenance of the KPA's major chemical warfare systems (ADM-48D, AGV-3, ARS-12/14, etc). The chemical defense regiment has an estimated personnel strength of 700, and is organized into a headquarters, rear services element, 2-4 chemical defense battalions, and 1 chemical reconnaissance battalion.

Below the General Staff Department level there is the army group Chief of Chemical Defense, who is responsible for all chemical warfare activities within the army group. The army group is a wartime headquarters which directs the activities of subordinate corps. During peacetime these headquarters are held at cadre strength, awaiting activation. Upon activation they are staffed by designated personnel from within the General Staff Department and its various commands; with the chemical warfare assets (probably a battalion) coming from the chemical defense regiment subordinate to the Chemical Bureau. During any future conflict the KPA will deploy 2-3 army groups (2 forward and 1 rear), each with one chemical defense battalion.

At corps level the chemical warfare assets consist of a chemical defense section (3 officers and 3 enlisted men) within the corps headquarters and a chemical defense battalion, under the direct command of the corps chemical defense officer. The battalion has an estimated personnel strength of 275, and is organized into a headquarters, rear services element, 2 decontamination companies and 1 reconnaissance company. This battalion is responsible for the corps chemical supply depot.

The chemical warfare element at division level consists of a chemical defense section (1 officer and 1 enlisted man) within the division headquarters and a chemical defense company subordinate to the division chemical defense officer. The company has an estimated personnel strength of 85, and is organized into a headquarters, rear services element, 2 decontamination platoons and 1 reconnaissance platoon (Figure 6. Chemical Defense Company). This company is responsible for the division chemical supply depot.

Within regiments and independent brigades there typically exists a chemical defense platoon, subordinate to the unit's chemical defense officer. This platoon has an estimated personnel strength of 26. There are no known organic chemical defense units below regiment/brigade level. However, each subordinate headquarters has a chemical warfare qualified officer, or

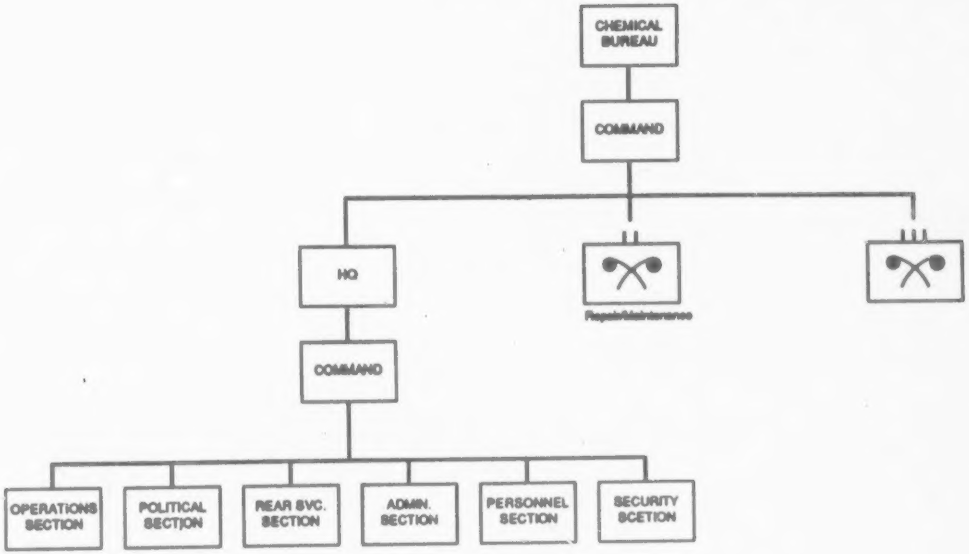
CHEMICAL BUREAU
COMMAND
HQ
Repair/Maintenance
COMMAND
OPERATIONS SECTION
POLITICAL SECTION
REAR SVC. SECTION
ADMIN. SECTION
PERSONNEL SECTION
SECURITY SCETION

FIGURE 5
KPA CHEMICAL BUREAU

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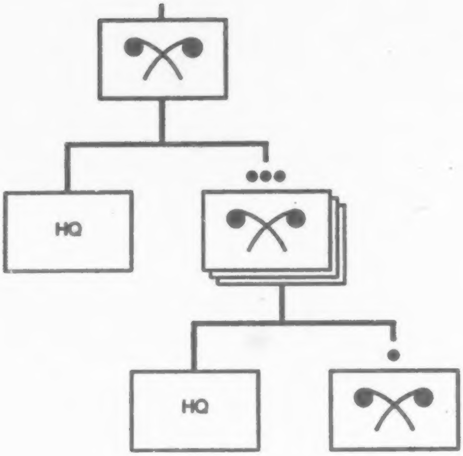

FIGURE 6
KPA CHEMICAL DEFENSE COMPANY

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senior NCO, who with the assistance of the regiment chemical defense platoon, overseas his unit's NBC activities.

The organization of the KPA's chemical warfare force reflects a strong Soviet influence, and although it is considerably smaller then its Soviet counterpart, it remains the third largest such force in the world.

Offensive Employment of KPA Chemical/Biological Weapons

There is extremely little information regarding the deployment, command & control (C^2) and possible employment of the KPA's offensive chemical and biological weapons. However, it is believed that all such weapons are considered GHQ-level assets, and are stored within a network of highly secure depots throughout the country. With heavier concentrations to be found within the III Corps and the I,II, IV & V 'Forward' Corps.[70] If reported ROK intelligence estimates are accurate, those depots located within the 'Forward' Corps include, but are not limited to, "...180-250 tons of chemical and biological munitions ... stored in some 170 tunnels."[71] This would equate to approximately 45-62 tons per 'Forward' Corps. Any unit conducting a chemical or biological strike will receive augmentation in the form of Political Security Bureau 'Custodial and Guard' units, who will provide for the transportation, storage and security of these special munitions. While, preparation and technical support will be provided by the appropriate Chemical Bureau troops. All such strikes, with the probable exception of those conducted by the Korean People's Air Force (KPAF), will be planned and coordinated with the Artillery Command HQ.

Offensive chemical operations will typically be limited to either the beginning phases of any new conflict, or till such times that they are required as a strategic catalyst. In all likelihood, these operations will be confined to missions of extreme military or political importance, such as:

- Neutralization of ROK/U.S. NBC, C^3I, and missile assets; airfields; and other sensitive military facilities (POL storage sites, mobilization centers, etc.).
- The neutralization of ROK/U.S. units deployed along the demilitarized zone.
- Destruction of the ROK political leadership.
- The interdiction of major lines of communications, for the reinforcement or resupply of forces on the DMZ.

- The interdiction of important topographic features (mountain passes, hills, tunnels, etc.), and civilian facilities (dams, nuclear powerplants, etc.).

The weapon systems most likely to be employed to deliver a KPA chemical attack include: the FROG-5 and SCUD B battlefield support missiles; army/corps-level artillery and multiple rocket launcher (MRL) assets; and the KPAF.[72]

The KPA currently deploys two FROG-5 artillery rocket regiments (a total of five battalions) and one SCUD B missile regiment, with a total of approximately 32 transporter-erector-launchers (TEL).[73] With maximum ranges of 60 km and 300 km respectively, these missiles threaten a majority of the ROK (Figure 7. KPA Missile Threat). An indication of the seriousness of this threat is that of the 109 active air fields/bases within the ROK, 48 are within the operational range of FROG-5 and 91 are within operational range of the SCUD B range. The employment of these missile systems is facilitated by the fact that a majority of them are now deployed within the 'Forward' Corps, in fortified bunker complexes. These complexes are typically located within short distances of, or adjacent to, pre-surveyed launching positions. To launch an attack a TEL would simply move out of its bunkers, launch and then return to the protection of its bunker. It is probable that the chemical warheads are stored in special separate, but co-located, bunkers.

The artillery and MRL assets available, for delivery of a chemical attack at army/corps-level, are considerable. At army-level there are at least one artillery and two MRL divisions. While, each 'Forward' Corps has approximately nine battalions each of MRLs and field artillery. Despite this duel artillery/MRL capability it is reasonable to expect that the MRLs will be the prime delivery system for chemical for a number of reasons. Most significantly these systems have a larger warhead then a comparable artillery systems; and the firing units have a higher rate of fire, with the resulting ability to quickly saturate a target area. The majority, if not all, of these artillery/MRL assets are also provided with fortified bunkers, which are equipped for NBC defense.

Due to the KPAF's limited offensive capability and the probability of ROK/U.S. air superiority, it is not likely to be employed for large scale chemical weapons strikes. The few such strikes that are anticipated, will be limited to targets of extreme importance and are likely to supplement missile strikes.

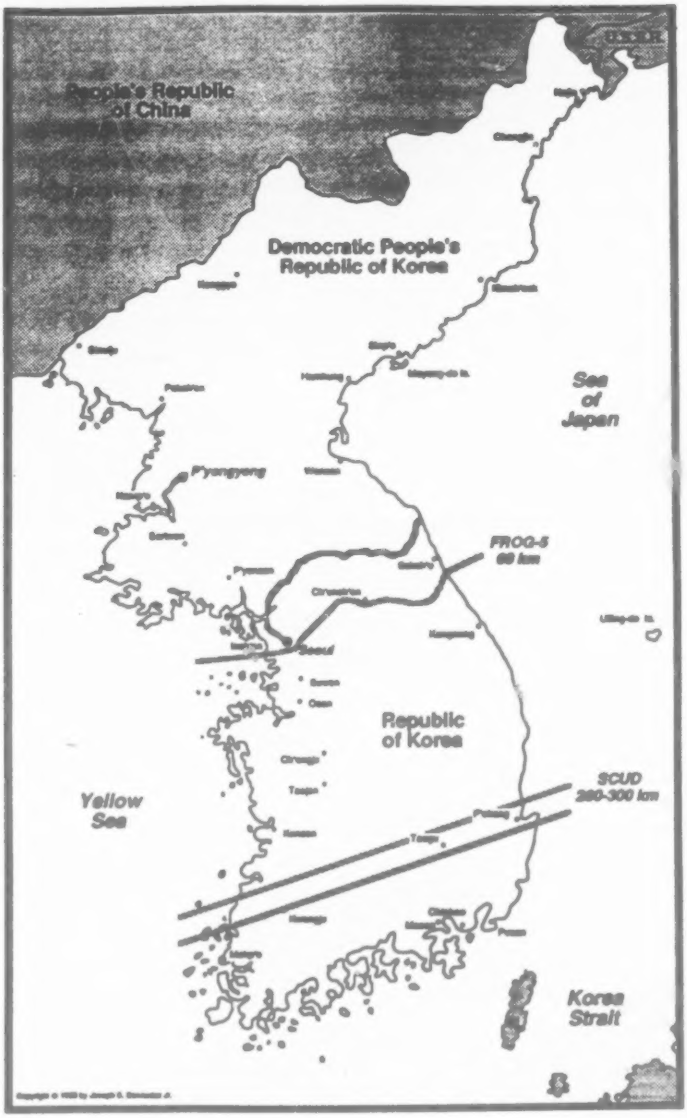
U.S.S.R.
People's Republic of China
Democratic People's Republic of Korea
Sea of Japan
Pyongyang
Seoul
FROG-5 66 km
Republic of Korea
Yellow Sea
SCUD 280-300 km
Korea Strait

FIGURE 7
KOREAN PEOPLE'S ARMY
TACTICAL BALLISTIC MISSILE THREAT

During the opening phases of a new conflict, FROG-5 and SCUD B missiles will be targeted against strategic targets (i.e. ROK/U.S. air bases, C^3I facilities, NBC assets, Inch'on and Seoul). While the army/corps-level artillery and MRL assets will be responsible for operations against ROK/U.S. forces deployed along the DMZ, second echelon units, and tactical reserves. Chemical attacks will consist of a combination of different agents depending upon the target, tactical situation, and weather conditions. If a target area will not be quickly occupied by KPA troops, then an attack featuring persistent agents can be anticipated. However, when KPA troops are expected to occupy, or move through the target area, non-persistent agents will be employed. While persistent agents will be employed in adjacent areas in an effort to isolate the avenue of attack from counterattack. It is important to note, however, that the KPA has historically demonstrated a willingness to sustain large numbers of casualties in order to achieve specific objectives. If the KPA believes that a persistent agent would be the ideal choice for a specific target they will employ it, move their troops through it, and take the resulting casualties. However, where possible the KPA will adopt the technique of contamination avoidance to keep their troops safe. ROK/U.S. airfields, NBC, C^3I and missile assets, which presumably have the highest priority for chemical attack, are likely to be attacked with a combination of agents. Chemical missile strikes on these targets are anticipated to be followed by 'Special Purpose' force (elite ranger/commando type light infantry) assaults.[74] Any degradation of operational capability within these assets will have a significant effect on the ability of ROK/U.S. forces to conduct the defensive battle.

If employed, biological weapons will most likely be targeted against rear area objectives such as food supplies, water sources and urban and rural population centers. Due to the physical nature of biological weapons it is likely that the KPAF aircraft (i.e. AN-2s (NATO: Colt)), using commercially adapted spraying equipment, will be the primary means of their employment. Such biological attacks may be staged by small numbers of KPA 'Special Purpose Force' troops.[75]

Conclusions

There is no doubt that the KPA presently produces, and possesses the capability to effectively employ throughout the Korean Peninsula, significant quantities and varieties of offensive chemical and biological weapons. Due to a grand strategy which calls for a "one-blow, non-stop" assault that will capture the entire Korean Peninsula before the U.S. and the world can react; a deep-seated (almost fanatical) distrust of both the ROK and U.S. governments; and the belief that their respective armies possess, and are willing to employ nuclear, chemical and biological weapons, the KPA has developed a doctrine which includes the tactical 'first use' of chemical weapons. This 'first use' is further reinforced by These doctrinal factors are further exacerbated by a leadership that has...

> "...not made any known official declaration of their intentions to employ or prohibit the use of chemical agents"; and has exhibited "...a lack of regard for world opinion, as demonstrated by their unpredictable and belligerent acts of the past several years; and are determined to reunify the entire Korean Peninsula under communist rule..."[78]

This complex situation has resulted in an environment in which traditionally accepted policies for deterrence of 'first use' and non-proliferation are not directly applicable.

Even more disconcerting then the use of chemical or biological weapons on the Korean Peninsula is the apparent DPRK willingness to provide other Third World countries with the technology required to produce and offensively employ chemical and biological weapons. Or alternately, to cooperate with such countries in the field of chemical and biological weapons development. It is presently believed that such cooperation exists between the DPRK and Syria (biological) and Iran (chemical). The possibility also exist that such a connection exists between the DPRK and Libya.

Finally, there is also the fear that the DPRK might employ chemical or biological weapons during one of its numerous 'anti-ROK' terrorist operations, or provide such weapons to any one of the many terrorist groups with which it has intimate connections (i.e. Japanese Red Army).

Appendix A.
Chemicals on the Australian Group Control List[77]

Chemical Abstracts Service Registry name		Applicable CWC Schedule
Core Export Control List		
111-48-8	Thiodiglycol	2
10025-87-3	Phosphoryl chloride	3
756-79-3	Dimethyl methylphosphonate	2
676-99-3	Methylphosphonyl difluoride	1
676-97-1	Methylphosphonyl dichloride	2
868-85-9	Dimethyl hydrogen phosphite	3
7719-12-2	Phosphorus trichloride	3
121-45-9	Trimethyl phosphite	3
Warning List		
7719-09-7	Thionyl chloride	Not listed
3554-74-3	N-methyl-3-piperidinol	2
96-79-7	2-N,N-diisopropylaminoethyl chloride	2
5842-07-9	2-N,N-diisopropylaminoethyl mercaptan	2
1619-34-7	3-quinuclidinol	2
7789-23-3	Potassium floride	Not listed
107-07-3	2-chloroethanol	Not listed
124-40-3	Dimethylamine	Not listed
78-38-6	Diethyl ethylphosphonate	2
2404-03-7	Diethyl N,N-dimethylphosphoramidate	2
762-04-9	Diethyl hydrogen phosphite	3
506-59-2	Dimethylammonium chloride	Not lisited
1498-40-4	Ethylphosphonous chloride	2
1066-50-8	Ethylphosphonyl dichloride	2
753-98-0	Ethylphosphonyl difluoride	1
7764-39-3	Hydrogen fluoride	Not listed
76-89-1	Methyl benzilate	2
676-83-5	Methylphosphonous dichloride	2
96-80-0	2-N,N-diisopropylaminoethyl alcohol	2
464-07-3	Pinacolyl alcohol	2
57586-11-8	Substance QL	1
122-52-1	Trietyl phosphite	3
7784-34-1	Arsenic trichloride	2
76-93-7	Benzilic acid	2
15715-41-0	Diethyl methylphosphonite	2
6163-73-5	Dimethyl ethylphosphonite	2
430-78-4	Ethylphosphonous difluoride	2
753-59-3	Methylphosphonous difluoride	2
3731-38	3-quinuclidone	Not listed
10026-13-8	Phosphorus pentachloride	Not listed
75-97-8	Pinacolone	Not listed
151-50-8	Potassium cyanide	Not listed

Appendix B.
Selected Chemical Agents[78]

Agent Class	Name	Type	Remarks
Lethal	Tabun	Nerve	Nonpersistent
	Sarin	Nerve	Nonpersistent
	Soman	Nerve	Nonpersistent
	---	Nerve	Persistent, rapid action
	Hydrogen Cyanide	Blood	Nonpersistent, rapid action
	Cyanogen Chloride	Blood	Nonpersistent, rapid action
	Phosgene	Choking	Effects lungs, causes suffocation
	Chlorine	Choking	Effects lungs, causes suffocation
Damaging	Sulphur mustard	Blister	Can be fatal if breathed
	Lewisite	Blister	Causes skin burns, affects respiration
Incapacitating	---	Affects brain	Causes hallucinations and psychosis
Riot Control	OCBM	Tear Gas	Irritates eyes
	Chloropicrin	Respiratory	Irritates lungs

Appendix C.
Chemical Warfare Terminology[79]

Chemical Warfare Agent. A solid, liquid or gas which, through its chemical properties, produces lethal or damaging effects on humans, animals, plants or material.

Decontamination. The process of removing, destroying or neutralizing a contaminant.

Incapacitating Agent. A chemical agent producing temporary physical or mental effects which render individuals incapable of a concerted effort in performing assigned duties.

Nonpersistent Agent. A chemical agent which retains its toxicity for several hours or less under normal weather and terrain conditions.

Persistent Agent. A chemical agent which retains its toxicity for several hours or less under normal weather and terrain conditions.

Persistent Agent. A chemical agent which retains its toxicity for one to several days under normal weather and terrain conditions.

Thickening Agent. A substance added to a chemical agent to increase its viscosity.

Thinning Agent. A substance added to a chemical agent to lessen its viscosity.

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[6] U.S. Army. "Handbook of the North Korean Armed Forces" [Declassified], DA Pamphlet No. 30-52, 11 July 1962, pg.41; and U.S. Army. "Tables of Organization and Equipment of the North Korean Army" [Declassified], Special Report No. 304, 1 July 1957, Charts 68, 99 and 105.

[7] 'Forward' refers to a unit deployed along the demilitarized zone (DMZ), which today consists of the I, II, IV, & V Corps.

[8] Interestingly enough, the PRC apparently didn't initiate wide ranging atomic defense exercises within the PLA until 1957. ***China Builds the Bomb***, pg. 217.

[9] U.S. Army. "Order of Battle: North Korean Army" [Declassified], Special Report No. 325, 1 January 1958, pg. 51.

[10] Ibid., pp. 55, 73 & 89.

[11] Ibid., pp. 51, 54, 63, 79 & 87.

[12] Ibid., pg. 11. This report gives the location as being EA 2834.

[13] For information on World War II Japanese chemical and biological operations see: Powell, John W. "Japan's Biological Weapons: 1930-1945", ***Bulletin of the Atomic Scientists***, October 1981, pp. 44-52; Tanaka, Yuki. "Poison Gas: The Story Japan Would Like to Forget", ***Bulletin of the Atomic Scientists***, October 1988, pp. 10-19; Morimura, Seeiichi. ***The Devil's Gluttony*** [Japanese], 1983; and Cookson and Nottingham, pp. 55-56 & 296-7.

[14] "Handbook of the North Korean Armed Forces" [Declassified], pg.125.

[15] Ibid. The reference to the Japanese Type-93.3 may in fact refer to the Type-95 or Type-98 series of masks. See: ***Imperial Japanese Ordnance Review***, World Photo Press, Tokyo, 1983 (?), pp. 127-130.

[16] Ibid.

[17] "Handbook of the North Korean Armed Forces" [Declassified], pg.125

[18] U.S. Army. "North Korean Army Engineers" [Declassified], EIS 323, February 1962, pg. 13.

[19] U.S. Army. "Capabilities of the Munitions Industry of North Korea" [Declassified], Intelligence Staff Study, Project No. 9050, 15 June 1955, pp. 5-6.

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[21] These 'hardened' facilities are typically: dug deep into the 'reverse slopes' of granite mountains; provided with steel protective doors, which seal the position from napalm and gas attack; and are provided with 'over-pressure' NBC systems. For a discussion of the DPRK's policy of 'burying' military facilities see: Schemmer, Benjamin F. ""Everything is Buried!": North Korea Buries its Aircraft, Guns, Submarines, and Radars Inside Granite", ***Armed Forces Journal International***, August 1984, pgs. 94-97.

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[29] Manabu, Aota. ***Kim Il Sung's Army***, Contemporary Affairs Series, No. 286, Nyumon Shinsho, Kyoikusha, Tokyo, 1979, pg.72.

[30] U.S. Army, "North Korean Paramilitary Reserve Forces" [Declassified], SRD-6-4-73, January 1975, pg.8.

[31] "North Korean Paramilitary Reserve Forces" [Declassified], pg. 15.

[32] "Chemical Warfare Activity in North Korea" [Declassified], pg. 56.

[33] ***The Korea Herald***. "North's Use of Chemical Weapons Said Likely", 7 May 1985, pp. 1-2; ***The Korea Herald***. "Pyongyang's Growing Arsenal", 30 May 1986, pg. 4; and ***Free Press International***. "N. Korea is mass producing chemical weapons: U.S. report", 8 June 1986, pg. 4.

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[35] U.S. Congress. "Statement by General John A. Wickham Jr., Chief of Staff, United States Army before a Subcommittee of the Committee on Appropriations, House of Representatives", 25 February 1986, pp. 137-138.

[36] "Pyongyang's Growing Arsenal", pg. 4

[37] P'yongyang KCNA [in English], 0507 GMT, 30 May 1986.

[38] ***Washington Post***. "North Korea Accused", December 13, 1988, pg. A16; and "N. Korea is mass producing chemical weapons: U.S. report", pg. 4.

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[40] Ibid. and U.S. Army, "North Korean People's Army Operations" [Unclassified], FC 100-2-99, 5 December 1986, pg. 11-4.

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[42] This agreement is still in effect. Both Soviet Naval Aviation and Soviet Air Force reconnaissance and strike aircraft now make periodic overflights of the Yellow and East China Seas, occasionally flying simulated strike profiles against Okinawa. U.S. Congress. "Statement of Rear Admiral William O. Studeman, U.S. Navy, Director of Naval Intelligence, Before the Seapower and Strategic and Critical Materials Subcommittee of the House Armed Services Committee in Intelligence Issues", 1 March 1988, pg. 41.

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[44] As cited in: ***North Korea News***. "Soviets Supply North Korea With Deadly Nerve Gas", November 24, 1986, No. 349, pg. 3.

[45] U.S. Army. "Opposing Force Training Module: North Korean Military Forces", FM 34-71, 5 February 1982, pg.7-1.

[46] "Chemical Warfare Activity in North Korea" [Declassified], pg. 2; and "North Korean People's Army Operations", pg. 16-11.

[47] This new PRC suit is apparently based upon British carbon fiber technology.

[48] There is also some indication that during the early 1980s the DPRK purchased a small number of modern chemical protective suits from Japan. Reportedly for the protection of petro-chemical workers.

[49] "Chemical Warfare Activity in North Korea" [Declassified], pg. 2.

[50] Mounted on the Sungni-58/61/1010 series of trucks.

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[53] See note #3 above.

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[56] U.S. Army. "Monazite Production in North Korea" [Declassified], ***FEC Intelligence Digest***, GHQ, FEC, MIS-GS, 2 December 1951, pp. 12-16.

[57] Ibid.

[58] Ibid.

[59] ***China Builds the Bomb***, pg. 146.

[60] Gordon, Michael R. "North Korea Joins Pact to Prevent the Spread of Nuclear Weapons", ***New York Times***, 27 December 1985, pg. A3. The use Uranium and Graphite was probably due to the DPRK's inability to indigenously produce 'heavy water'; the use of which would make the DPRK dependent on a foreign government.

[61] Ibid.

[62] Ibid.

[63] ***North Korea News***. "North Korea's First Nuclear Power Plant to be Built with Soviet Aid", October 26, 1987, No. 395, pg. 5.

[64] "Statement by General John A. Wickham Jr., Chief of Staff, United States Army before a Subcommittee of the Committee on Appropriations, House of Representatives", pp. 137-138.

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[69] *Kim Il Sung's Army*, pg.72.

[70] "Pyongyang's Growing Arsenal", pg.4.

[71] Ibid.

[72] The FROG-5 entered KPA service during 1969-70. The DPRK is currently producing an indigenous variant of the SCUD B. The first regiment of which is believed to have become operational during the end of 1988. The DPRK has sold approximately 80-100 of these SCUD Bs to Iran, for use in its war with Iraq. It is further believed that the DPRK is working on a product-improved SCUD B, which will be operational during 1989-1990. Carus, W. Seth and Bermudez Jr., Joseph S. "Iran's Growing Missile Forces", *Jane's Defense Weekly*, Volume 10, Number 3, 23 July 1988, pp. 126-131; and Bermudez Jr., Joseph and Carus, W. Seth. "Missile Development in the DPRK", unpublished paper, 1988-89.

[73] Ibid.

[74] The Korean People's Army presently fields one of the world's largest 'Special Purpose Forces' (SPF). At present it numbers approximately 100-120,000, and comprises 12-13% of the total KPA peacetime strength. It is important to note that captured, or killed, 'Special Purpose Force' infiltrators have frequently been equipped with the ShM series of masks. See Bermudez Jr., Joseph S. *North Korean Special Forces*, Jane's Publishing Company, Ltd., 1988, pp. 1-10.

[75] Ibid..

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EXHIBIT NO. 7

CHEMICAL WARFARE AGENTS

Agents have different effects and utility. They can be used in concert with each other for maximum effect. Some linger for only minutes (non–persistent), others can contaminate for days (persistent). They can be dispersed in liquid, gas, or solid form.

INCAPACITATING AGENTS cause short term illness or psychoactive effects (delirium, hallucinations).

BZ

BLISTER AGENTS destroy skin and tissue. Contact with eyes can cause blindness. Inhalation can damage lungs. Resulting respiratory damage can be fatal.

SULFUR MUSTARD (H or HD)
NITROGEN MUSTARD (HN)
LEWISITE

CHOKING AGENTS **cause hemorrhaging of blood vessels in lungs. Fluid will build up in lungs until victim chokes on his own fluids.**

PHOSGENE (CG)
CHLORINE
CHLOROPICRIN

BLOOD AGENTS **rapidly block the blood's ability to distribute oxygen. Exposure causes choking and eyes to tear.**

HYDROGEN CYANIDE (AC)
CYANOGEN CHLORIDE (CK)

NERVE AGENTS **rapidly disrupt the nervous system, causing convulsions and paralysis, often resulting in death. Can act either through inhalation or contact with skin.**

TABUN (GA)
SARIN (GB)
SOMAN (GD)
GF
VX

BIOLOGICAL WARFARE AGENTS

Living organisms (bacteria, viruses), and their derivatives, which cause disease or death.

Potential widespread health effects.

Dependent on ability to multiply in the attacked organism.

Very hard to defend against.

Not as controllable or predictable as chemical agents.

PLAGUE
ANTHRAX
Q–FEVER
SALMONELLA

***TOXINS* are chemical substances made from living organisms or genetic engineering techniques.**

EXHIBIT NO. 8

CONFIRMED POSSESSORS

U.S.
U.S.S.R.
Iran
Iraq.

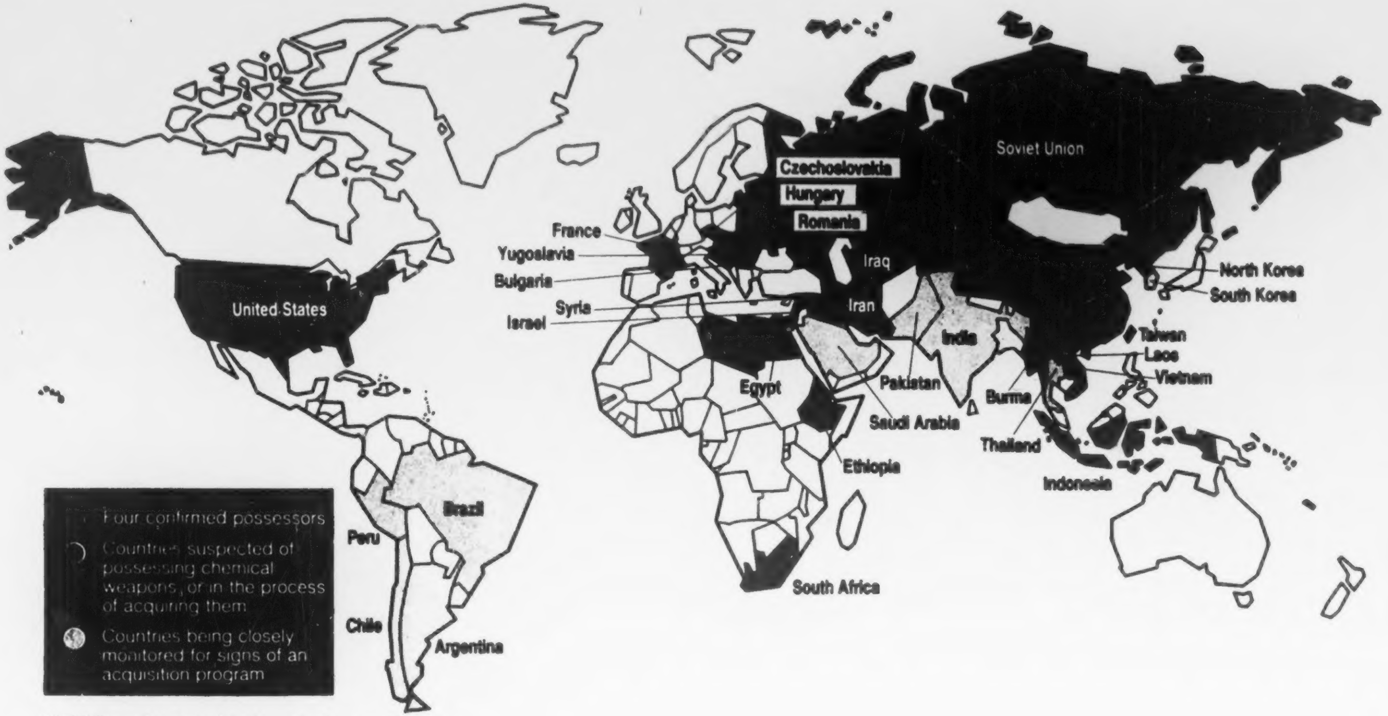
Countries Suspected of Possessing Chemical Weapons or In the Process of Acquiring Them

Bulgaria
Burma
China
Czechoslovakia
Egypt
Ethiopia
France
Hungary
Indonesia
Israel
Laos
Libya
North Korea
Romania
South Africa
Syria
Taiwan
Vietnam
Yugoslavia

Countries Being Closely Monitored for Signs of an Acquisition Program

Argentina
Brazil
Chile
India
Pakistan
Peru
Saudi Arabia
South Korea
Thailand

Credit: Christian Science Monitor based on U.S. Government officials


Soviet Union
Czechoslovakia
Hungary
Romania
France
Yugoslavia
Bulgaria
Syria
Israel
Iraq
Iran
United States
North Korea
South Korea
Taiwan
Laos
Vietnam
India
Pakistan
Burma
Thailand
Egypt
Saudi Arabia
Ethiopia
Indonesia
South Africa
Brazil
Peru
Chile
Argentina
Four confirmed possessors
Countries suspected of possessing chemical weapons, or in the process of acquiring them
Countries being closely monitored for signs of an acquisition program

SOURCE: The Christian Science Monitor, based on U. S. Government Officials.

EXHIBIT NO. 9a

CENTER FOR SECURITY POLICY

6 January 1989

THE LIBYAN CHEMICAL WARFARE FACILITY: A LESSON IN THE DO'S AND DON'TS OF CONTROLLING THE PROLIFERATION OF CHEMICAL WEAPONS

Introduction:

Over the next few days in Paris, leading members of the international community will consider a serious threat to world peace: the proliferation of chemical weapons (CW) and a growing willingness by nations to engage in their use. The latter has occurred in several parts of the Third World, notably in the Iran-Iraq war, in violation of the existing 1925 Geneva convention banning **first-use** of chemical weapons. The threat of still more widespread CW employment mounts as additional nations obtain ballistic missile and other technologies compatible with long-range delivery of lethal chemical agents.

Many of those participating in the Paris meeting -- including the United States government -- have embraced the view that the proper response to the violation of the present chemical arms control regime and the growing number of countries possessing chemical munitions is to adopt a new, global ban on **production and stockpiling** of these weapons. The conference is expected, as a result, to impart new impetus to the on-going multilateral negotiations in Geneva on a treaty imposing such a ban.

The meeting in Paris will also feature -- if not be dominated by -- discussions of the incipient capacity of Libya to produce large quantities of chemical weaponry. **Ironically, the massive Libyan facility provides a prime example of the utter futility of a global chemical weapons ban.**

What the Libyan Plant Demonstrates:

Recent public disclosures concerning the consultations the United States has had with allied and other nations on the character of and need to deal with the nearly completed Libyan chemical manufacturing complex reveal two key factors that render a global CW ban infeasible:

Verification: While the Libyan plant is a dedicated CW facility, Ghadafi's protestations that it is a pharmaceutical complex nicely illustrates the problem: essentially any facility that actually is meant for production of civilian chemical products (for example, pesticides, fertilizers, and pharmaceuticals) has **the inherent ability to produce toxic** chemical agents for weapons.

The length of time it might take a given country to convert its chemical plants from innocuous activities to lethal military ones could be exceedingly short. How short would largely depend upon the extent of advance preparations undertaken, subject entirely to the control of the government in question. Such considerations defy any known verification scheme -- a point made starkly recently by representatives of the U.S. government in rejecting the Libyans' invitation to perform an on-site inspection of their new complex.

In fact, the verification problem associated with a CW ban is made even more intractable by the fact that **chemical agents (and biological and toxin weapons for that matter) can now be manufactured using commercially available systems that can be located at essentially any facility.** There need not be any unique construction features or other signatures to such facilities that might assist in identifying and monitoring them for compliance with a global CW ban. The truth of the matter is that one is not likely often to have as abundant circumstantial evidence about the malevolent purposes to which a given production complex is devoted than is presently the case with the Libyan site -- reportedly ringed by a 40 foot earthen wall, highly sophisticated air defenses and other security features.

Enforcement: The behavior of the international community to date in response to that astonishing evidence demonstrates the further problem one faces even where it is possible to make a strong case that CW activity is underway. **Few countries are willing to endorse a conclusion certain to result in unpalatable choices:** either living with the knowledge that a regime that aggressively sponsors and equips world-wide terrorist activities has the ability to produce the "Poor Man's Atomic Bomb" or taking steps to eliminate that ability. Even where there is considerable reason to believe that nationals of allied countries have been directly involved in constructing and financing the Libyan CW complex -- and, therefore, have first-hand knowledge of its capabilities -- these allies recoil from accepting the obvious conclusions.

What is more, experience has shown that the more solemn the international commitment being breached by an activity, the more resistant third-party nations become to crying foul. The United States has encountered this phenomenon repeatedly in its effort to arouse allied ire over Soviet violations of various arms control accords, notably the clear-cut breach of the ABM Treaty by construction of an illegal radar at Krasnoyarsk. It is only reasonable to expect that it would be even more difficult to arouse international outrage over a suspected infraction of a newly signed CW ban than is the case at present with the Libyan plant -- especially where the evidence is less compelling.

Policy Prescriptions:

The current crisis over the Libyan chemical weapons plant argues for adopting certain policies for contending with the Libyan and other episodes of chemical weapons proliferation:

- The West should abandon the illusion that CW proliferation can be halted -- or even meaningfully slowed -- by an inherently unverifiable ban on production and stockpiling of chemical weaponry.
    - Western democracies must discard the notion, and the accompanying rhetoric, that an effective verification regime might be developed that would redress the intrinsic and unavoidable problems associated with such a treaty.
    - Doing otherwise is a formula for chemical disarmament only on the part of nations -- like the United States -- that live up to its international commitments.
- Instead, the United States and its allies should be focussing on enforcement of the **existing** CW arms control convention -- banning first-use of chemical weapons.
    - Establishing the willingness of nations to take specific, practical actions in response to such first-use would not only have a salutary effect insofar as it shored up the present inhibition to CW activities.
        - It would also provide an important bellwether of the willingness of the international community to demand compliance with future arms control accords.
- The United States and other Western nations should also maintain modest, but effective stockpiles of chemical weapons -- the only time-tested deterrent to the use of toxic CW by aggressors.
    - In this regard, Vice President George Bush -- to his lasting credit -- on several occasions since 1983 has played a politically courageous role in casting deciding votes in the Senate for the long-overdue modernization of the U.S. arsenal with binary chemical systems.
- The United States (and, preferably, other allied nations) should not rule out the use of force against identified CW production capabilities of countries like Libya that actively support international terrorism and aggression.

- As an immediate step, however, the United States should -- at the Paris meeting and thereafter -- press for specific economic and financial steps against Libya.
    - All contracts involved in the construction, equipping and operation of the new Libyan chemical production complex must be terminated at once.
        - Any foreign company found not complying with this demand forthwith should be subject to U.S. import controls under the Export Administration Act, with the effect of barring them from exporting to the U.S. marketplace.
    - All financing associated with the construction, equipping and operation of the Libyan CW complex must cease, for example all disbersements under existing loan agreements should be terminated and no new supplier credits offered.
        - Any foreign bank, company or consortium providing credit to the Libyan Arab Foreign Bank or other agencies of the Libyan government in connection with this facility found not complying with this demand should be subject to restrictions on their banking activities within the United States (e.g., the operations of their U.S. branches and subsidiaries).
    - All Western deposits in the Libyan Arab Foreign Bank should be immediately removed (through the interbank deposit market) pending the complete dismantling and elimination of the Libyan CW plant.
    - By forcing such enterprises to choose between the American market for their goods and services and that of Libya, a direct and therapeutic impact can quickly be had on the Libyan regime and the means by which it hopes to advance its anti-Western agenda.

This paper is one of a series of occasional contributions by the Center for Security Policy to the national debate on foreign policy and defense issues. Such contributions are intended to invigorate and enrich that debate; they do not necessarily reflect the views of all members of the Center's Board of Advisors. If you would like more information about this topic or other work of the Center, please contact the Director, Frank J. Gaffney, Jr.

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EXHIBIT NO. 9b

17 January 1989

IS THE UNITED STATES ALSO EXPORTING CHEMICAL WEAPONS MANUFACTURING TECHNOLOGY?

A Dangerous New U.S.-Soviet Joint Venture

Summary:

In the midst of a major diplomatic crisis with one of its closest allies, the Federal Republic of Germany, over the transfer to Libya by the latter's nationals of equipment and technical know-how needed to manufacture chemical weapons, the United States has approved a joint venture with the Soviet Union that could have even more damaging results.

In a rushed decision taken just before Christmas, the Reagan Administration has apparently given the go-ahead to the Louisiana-based Bailey Controls, Inc. and Honeywell to supply the Soviet Union with the wherewithal to manufacture extremely sophisticated automated production controls. These devices have the potential to enhance significantly Soviet military capabilities. Unless reversed, the Administration's decision on this transfer will:

(1) Put into Soviet hands modern technology exceedingly well suited to efficient chemical -- and nuclear -- weapons production;

(2) Call into question the sanctity of the existing East-West export controls system (COCOM) -- at the very moment the United States is trying to encourage a new arrangement to curtail chemical weapons proliferation;

(3) Send a signal to the Soviets and to domestic industries that even joint ventures with manifestly dubious implications for U.S. security will be approved.

The incoming Bush Administration should make one of its first acts in office a suspension of government approval for this joint venture. Such a suspension will afford an opportunity to perform a needed review of the deal's national security implications, including the chemical warfare proliferation dimension.

Facts and Discussion:

- In the period just before the Christmas holiday, the United States government was asked to approve a proposed joint venture between two U.S. companies (Bailey Controls, Inc. of

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Louisiana and Honeywell, Inc.) and a state-run organization in the Soviet Union.

- The venture would entail the transfer of the necessary machinery and continuing technical support needed to permit the Soviets domestically to produce highly advanced automated control devices.
  - Comparable devices are currently used by, among other American companies, E.I. Dupont at the Department of Energy's Savannah River nuclear weapons production plant.
- These controls are well suited to the sort of precision manufacturing entailed in the production of modern chemical weapons.
- Nearly as worrisome as the outcome of the U.S. government's decision-making process on this proposal was the quality of the process itself.
  - Acting under pressure from Louisiana Senator J. Bennett Johnston to approve the joint venture, and from Secretary of Commerce William Verity and the State Department, who generally take a forthcoming attitude toward such endeavors, the Reagan Administration acted on this proposal with extraordinary and undue dispatch.
  - As a result, there was insufficient time to document -- to say nothing of consider -- the national security implications of this transfer.
  - Such was the haste that it is still not clear how the United States will attempt to justify such a transfer to its allies as being consistent with COCOM guidelines.

Conclusions:

- The outgoing Reagan Administration's hasty and unwise decision to approve the Bailey Controls-Honeywell joint venture with the USSR should be suspended at once.
  - The Bush Administration must have an opportunity to assess the wisdom of providing the Soviet Union with key systems that will allow it to manufacture chemical and nuclear weapons more efficiently.
  - At a minimum, the inconsistency of this technology transfer with the U.S. government's efforts to curb the export from Western countries of systems applicable to the manufacture of chemical weapons must be reviewed.

- If permitted to stand, this proposed joint venture will have severe repercussions in COCOM.
  - It comes at a time when pressure is already mounting to gut the modest, but vital, COCOM regime for safeguarding militarily-relevant Western technologies.
  - It also roughly coincides with the imminent announcement in Vienna of a major East-West economics conference to be held in Bonn in 1990 -- an event whose sponsors clearly intend it to help eliminate whatever remaining discipline exists regarding economic, financial and technology flows to the Soviet bloc.
    - The latter is the more striking as it contrasts with concerted Congressional efforts to stimulate greater discipline and transparency in such flows.
- Unless reconsidered and reversed, the Bailey Controls-Honeywell application threatens to set a dangerous standard for the consideration of future joint U.S.-Soviet ventures.
  - Clearly, the sensitive technology involved in this venture will encourage others both in the United States and in allied nations to seek to export similar -- or even more sinister -- dual-use equipment and know-how to the Soviet bloc.
  - Moreover, this venture will invite efforts to repeat the combination of ill-advised political and bureaucratic pressure that apparently forced approval of this export application through the U.S. government in record time and without adequate interagency review.

EXHIBIT NO. 10A

[From the San Diego Union, February 5, 1989]

CHEMICAL WEAPONS: CAN THEY BE BANNED?

Too Many Ways to Hide Cheating

(By Frank J. Gaffney, Jr.)

News item: January 17, 1989, Washington. State Department sources disclosed today that the United States had evidence suggesting that Iraq (among other nations) has an active program for developing and producing biological weapons. Reports have been received charging that his nation, accused of attacking its Kurdish minority population with lethal chemical weapons, recently used biological agents to infect the Kurds with deadly typhoid germs.

This story is shocking on several levels. First, biological weapons (BW) are a particular heinous dimension of modern warfare. They are capable of prompt, brutal and wholesale human destruction. Second, BW agents can be cheaply produced, utilizing commercially available and relatively unsophisticated techniques. And third, it suggests that at least one country is willing—as are probably others—to risk international condemnation for trafficking in these monstrous weapons.

Interestingly, the same can be said of chemical weapons (CW). An important difference between the two classes of weaponry, however, lies in the fact that the production and possession of biological weapons is banned under international law; no such ban currently exists for CW.

In fact, apart from extremely modest research capabilities—dedicated solely to exploration of defenses against biological attack—no signatory is supposed to have any biological weapons-related activity. Today the United States has neither offensive BW capabilities nor even any appreciable capacity to defend itself against biological first-use by an adversary.

And yet there is powerful evidence that a number of countries—including the Soviet Union, as well as Iraq—have active biological weapons programs. Unfortunately, the Biological Weapons Convention does not provide for inspection of suspected sites. Its authors acknowledged that there was no monitoring regime likely to be effective in detecting BW activities if a nation wished to conduct them clandestinely. It was argued at the time, however, that some constraints on this dreadful business were better than none; in the event someone was believed to violate the convention, the moral weight of international opinion would quickly bring them to heel.

I mention this not as an argument for a new, offensive biological weapons program. The United States will be lucky if it can organize a viable—and permitted—program for researching BW defenses and antidotes.

Rather, I bring up this sorry state of affairs because many (like Elisa Harris in the accompanying article) argue that essentially the same approach should be applied to chemical weapons (CW). So great, we are told, are the risks of proliferation of chemical weapons—particularly in the Third World—that a ban on CW production and stockpiling must be quickly reported.

The unhappy truth of the matter is that, even if such a ban could be negotiated, replete with provisions for on-site verification far surpassing the admittedly unverifiable Biological Weapons Convention, the same outcome must be expected: The bad guys will retain illegal stocks of the banned substances and the good guys will dutifully disarm. Ronald Reagan used to say about a situation like this, "Fool me once, shame on you, fool me twice, shame on me."

The following are but a few of the reasons why we must not allow ourselves to be fooled again:

A treaty banning chemical weapons is unverifiable. If the debate over the exact character of the Libyan plant at Rabta demonstrates one thing vividly, it is that facilities capable of producing chemical weapons can take many forms and still be rapidly configured to manufacture toxic agents. Intrusive on-site inspection simply cannot ensure that such facilities remain unavailable for CW production—any more than it could be used to verify a ban on biological weapons. As the United States pointed out in rebuffing Moammar Gadhafi's invitation to visit the Rabta plant, even if one could tell what a fertilizer, pharmaceutical, pesticide or other complex was producing on any given day, there would be no assurance that chemical weapons were not being produced there on the next.

There is no real prospect of enforcing a global ban. Even where there is powerful evidence to suggest that a given facility is up to no good, it is naive to believe that the evidence will be judged persuasive by Western governments—to say nothing of it precipating sanctions or other enforcement measures.

Again the experience with the Biological Weapons Convention is instructive: When an illegal BW plant at Sverdlovsk blew up some years ago, venting lethal anthrax germs and killing substantial numbers of innocent people downwind, the international community—far from taking steps to enforce the breached arms control regime—indulged in endless arguments over the precise character of the facility. Those, we are assured, would enforce a new agreement banning chemical weapons did little more than fecklessly debate alternative explanations for the incident—including a number of tortuous and implausible ones advanced by the Soviets themselves.

Similarly, that community has shown itself utterly incapable of enforcing the existing limitations on chemical weapons. At the recent 149-nation conference on CW in Paris, the participants could not even bring themselves to condemn Iraq by name—to say nothing of imposing harsh economic or political sanctions against it—despite appalling and incontrovertible evidence of Kurdish and Iranian victims of Iraqi chemical attack. Indeed, the world was treated at that conference to the sight of Iraq, Vietnam, Libya, and the Soviet Union, all of whom appear to have violated the ban on first-use of CW, solemnly denouncing such use.

And yet people like Harris would have us believe that the adoption of a ban on chemical weapons production and stockpiling will not result in similar flimflammery. The argue (usually with straight faces) that the world community will act effectively to enforce a new treaty vigorously should it be violated—even though the evidence will be inevitably less compelling than in cases of first-use.

This is, as Samuel Johnson once said about second marriage, simply "the truth of hope over experience." The recent antics of the West German government in connection with the Libyan facility at Rabta—which German nationals, after all, have helped design and construct—signal that such hope is entirely misplaced.

The West will give up the only time-tested deterrent to chemical first-use—the ability to retaliate in kind. Should a global ban on CW be reached, Western nations will faithfully adhere to their commitments not to produce or stockpile chemical weapons, In so doing, they will eliminate the single, proven disincentive to chemical attack by future aggressors.

The argument is sometimes made that such an outcome will not matter, that the United States will retain the ability to respond to chemical attack with devastating conventional or nuclear retaliation. While the United States almost certainly will have such capabilities, it is not clear that they will be effective deterrents to chemical attack. In the first place, there are real—and understandable—inhibitions to nuclear retaliation for non-nuclear attack. Moreover, the Iranians' ability to mete out punishing conventional devastation on Iraq certainly did not deter the Iraqis from making use of chemical weapons; to the contrary, it was the ability that prompted the latter to resort to CW attacks in the first place.

Perhaps most worrisome of all, in the aftermath of a CW ban, Western countries will also likely deemphasize investments in chemical defensive gear. As has been the case with defense against biological warfare, it will almost certainly prove impossible to maintain a vigorous program for protecting against and counteracting chemical attack once no one is supposed to be able to mount such an attack. In fact, even in the face of current, massive CW threats from the Soviet Union and other countries, most NATO nations are woefully ili-prepared to defend even their troops—let alone their civilian populations—against chemical weapons.

In short, as much as one might wish it otherwise, a global ban on chemical weapons will not eliminate the problem of CW proliferation. It will, instead, simply make it more difficult for the United States to deter the use of such weapons against it and its allies. What is more, if that use does occur, its lethal effects will be greatly magnified by the degraded state of Western defenses likely to be induced by the false sense of security a ban inspires.

Other options (e.g., economic and other sanctions, redoubled efforts to shore up the existing ban on chemical first-use, export controls on chemical manufacturing technologies, etc.) should be vigorously pursued, given the genuine problem of CW proliferation. It would be more than a shame, however—it would be an irresponsible travesty—if, as in 1974, the United States were to forswear its right to a given military capability in the vain hope that others would follow suit.

EXHIBIT NO. 10B

[From the San Diego Union, February 5, 1989]

CHEMICAL WEAPONS: CAN THEY BE BANNED?

MAKE VIOLATIONS TOO GREAT A RISK

(BY ELISA D. HARRIS)

Some weeks ago, nearly 150 nations participated in an international conference in Paris aimed at restoring the long-standing taboo against poision gas. The final document of this historic meeting reaffirmed the 1925 Geneva Protocol's ban on the use of chemical and biological weapons. It also expressed support for the conclusion of a new international agreement outlawing the possession of chemical weapons (CW) altogether, thus providing a much needed boost to the current negotiations in Geneva aimed at achieving such an agreement.

The possibility of further progress in Geneva toward a complete chemical weapons ban has alarmed opponents of President Bush's effort to eliminate what he called "this terrible scourge" from the face of the earth. This small but vocal group argues that a chemical weapons convention (CWC) outlawing the development, production, possession, transfer and use of chemical weapons would not be "verifiable."

Opponents of the CWC further maintains that history proves that the only way to prevent the use of chemical weapons is by being able to threaten retaliation in kind. From this flows the requirement for retaining, rather than eliminating, chemical weapons stockpiles. Both of these arguments, however, are fatally flawed.

Treaty opponents are correct to say that the CWC is "not verifiable" if by this they mean that we cannot know with 100 percent certainty that all of its provisions are being adhered to by all parties at all times. But no treaty, however rigorously negotiated and carefully drafted, is perfectly verifiable. There will always be an element of risk involved in entering into arms control agreements, be they concerned with nuclear, conventional, or chemical arms.

But let us bear in mind that the vast majority of countries that sign such agreements adhere to their international obligations for the very reason that they agree to them in the first place—because it is in their interest to do so. The potential violators of arms control agreements are, therefore, a very small group indeed. Treaties such as the chemical weapons convention must seek to deter these countries by raising the risks of detection, and hence of global condemnation, as high as possible.

The chemical weapons treaty currently under negotiations in Geneva would accomplish this through the most ambitious and intrusive verification package ever considered in arms control negotiations. It would, for example, require all states that are parties to it to declare their chemical weapons stockpiles and production facilities, and to permit these declarations to be verified by international inspectors. Until such time as they are destroyed, and during the destruction process itself, all chemical weapons stockpiles and production facilities would be subject to continuous on-site monitoring.

Facilities producing super-toxic lethal chemicals for medical and other purposes as well as commercial chemical factories also would be carefully monitored. These facilities would be subject to a wide array of data reporting and on-site inspection requirements. Indeed, both because such facilities could be utilized for illicit chemical agent production, and because of the need to protect sensitive trade secrets and other information, chemical industry representatives from many parts of the globe, including the United States, are working closely with the negotiators in Geneva to devise the best monitoring procedures.

Underpinning all of these intrusive procedures, as a sort of extra insurance policy, would be the right of any party state to demand a snap inspection of a facility if it believes such a facility is engaged in activities prohibited under the treaty. These verification provisions, coupled with our own intelligence capabilities, should enable the United States to detect any militarily significant cheating far enough in advance to mount an effective response.

It is important to realize this prospective convention is derived largely from a draft chemical weapons treaty introduced by the United States in Geneva in 1984. The U.S. draft reflected knowledge gleaned from more than a decade of multilateral and bilateral efforts to ban chemical weapons. It was reviewed by the relevant intelligence agencies, approved by the Joint Chiefs of Staff, and subsequently introduced in Geneva by then-Vice President Bush on behalf of President Reagan.

Both the U.S. draft and the convention derived from it are, admittedly, imperfect. But it stretches the imagination to believe that the Joint Chiefs of Staff, George Bush and Ronald Reagan would have approved a treaty that might in any way compromise U.S. national security interests.

The second argument voiced by treaty opponents is that history proves that chemical warfare is deterred by maintaining rather than eliminating chemical weapons stockpiles. This, we are told, was one of the primary lessons of World War II: Both sides possessed chemical weapons but, with the exception of the Japanese, none of the major belligerents used them because of the threat of retaliation in kind.

This interpretation of the past is far too simplistic. History actually shows that there were several reasons why poison gas was not used in the last world war, and that the fear of retaliation in kind was but one of them. Other, equally important considerations included the belief that chemical weapons had not proven decisive in World War I, the absence of situations in which the use of poison gas would have made a military difference the personal attitudes of political leaders toward chemical warfare, and the lack of preparation for using such weapons. Indeed, it was probably this last consideration—the simple fact that chemical weapons had not been assimilated into the military forces of the time—that was critical in preventing their use in World War II.

More recent history raises further questions about the general validity of deterrence theories based on the threat of retaliation in kind, at least in terms of their application to chemical weapons. Iraq's use of chemical weapons in the Persian Gulf war probably influenced Iran's decision to develop a similar capability. Yet, although Iran ultimately was able to, and indeed did, threaten retaliation in kind, this did not deter Iraq from continuing to use chemical weapons against Iranian military forces. U.S. government officials say that on a limited number of occasions Iran made good its threat of retaliation, but this, too, did not deter further Iraqi chemical weapons use.

Even if chemical weapons do deter other others from using their chemical weapons, the United States, if Pentagon officials are to be believed, is likely to be bereft of a capacity to retaliate in kind for the foreseeable future. The Pentagon has argued for many years that the existing U.S. chemical weapons stockpile does not provide an adequate deterrent capability.

To make matters even worse, in 1986 President Reagan promised West German Chancellor Helmut Kohl that the United States would withdraw the chemical weapons it currently has in the Federal Republic by 1992, a step which many believe will further weaken the U.S. chemical deterrent posture. Although the United States started producing chemical weapons again in December 1987 after an 18-year production moratorium, technical and budgetary constraints are likely to preclude the military from procuring the very systems it believes necessary for deterrence purposes. Thus, even in the absence of a chemical weapons ban, the United States may be unable to deter the use of chemical weapons by threatening retaliation in kind.

Those who argue that chemical warfare can only be deterred by an in-kind capability are really arguing in favor of precisely that which the chemical weapons convention is expressly designed to stop—the spread of chemical weapons across the globe. If maintaining a capacity for retaliation in kind is the best means of preventing the use of chemical weapons, then logically all countries should possess such weapons. But as the Persian Gulf war has shown, Third World countries that possess chemical weapons are as likely to use them as to be deterred from such use.

The only truly effective means of preventing the further spread and use of poison gas is by eliminating all chemical weapons on a global scale. This is the main reason why Ronald Reagan and George Bush have sought to conclude a treaty in Geneva outlawing the possession of chemical weapons altogether. They recognize that a world in which all chemical weapons are banned is more secure then one in which the proliferation of such weapons is unrestrained.

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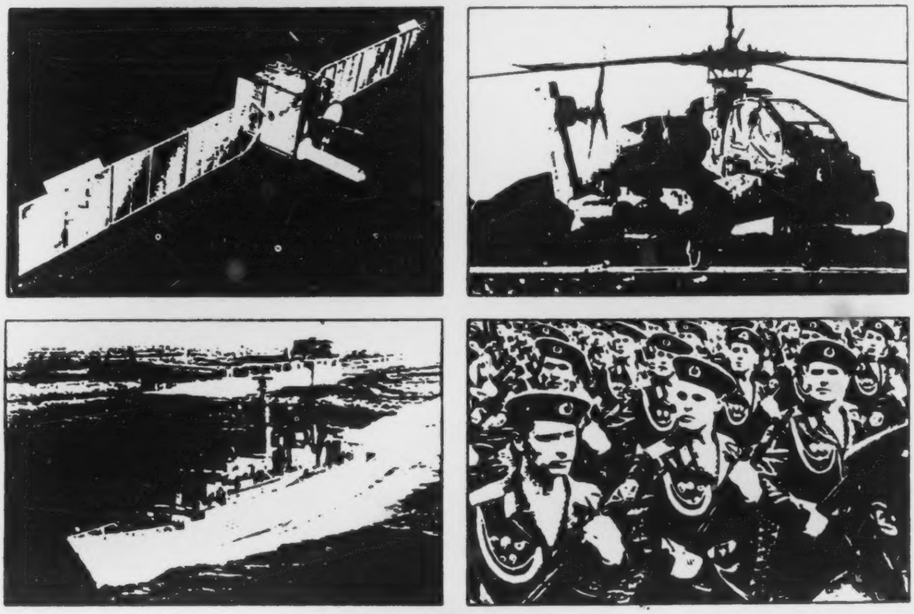

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Chemical Weapons Proliferation in the Developing World

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THROUGHOUT THE 1960s and 1970s, concerns about nuclear proliferation and about limiting Superpower nuclear arsenals overshadowed the subject of chemical weapons (CW) and their control. This situation changed abruptly in 1984, when the United Nations confirmed that chemical weapons were being used in the Gulf War.[1] More recent reports of biological weapons proliferation,[2] and of the proliferation of ballistic missiles in unstable regions such as the Middle East,[3] have only served to heighten concerns about the spread of non-nuclear weapons of mass destruction in the developing world.

Many believe that the threat to international security posed by chemical weapons proliferation and use now rivals that of nuclear weapons. As Kenneth Adelman, the director of the US Arms Control and Disarmament Agency (ACDA), told a Senate hearing in 1984,

> when I look to the remainder of this century and what kind of threats there are to security around the world, I personally put the threat of a nuclear war low, very low. I personally put the increasing use of chemical weapons around the world high.[4]

Others, however, point to differing estimates of the number of CW possessor states, and to conflicting reports concerning the identities and capabilities of such states, and question whether the CW proliferation problem is as serious as government officials suggest.[5]

This article explores the nature of the CW proliferation problem in the developing world by examining the following questions. Why might Third World countries decide to acquire chemical weapons, and what factors may constrain such acqusition? How extensive is the CW proliferation problem?

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What have been the national and international responses to the threat of CW proliferation? Finally, what are the likely implications if the CW proliferation problem is as serious as some suggest, and is not brought under control?

INCENTIVES FOR AND CONSTRAINTS ON CW PROLIFERATION

It is difficult to know precisely why Third World countries might decide to acquire chemical weapons. In each individual case, policymakers will undoubtedly be influenced by a variety of factors unique to their particular situation. In what follows, an attempt will be made to identify in more general terms possible incentives for, as well as constraints on, CW proliferation in the developing world.[6] The incentives for acquiring chemical weapons may be both political and military in nature. The constraints on CW acquisition are likely to be of a moral, legal, and technical character.

One reason why Third World countries may develop an interest in chemical weapons is because they may believe that such weapons have political value. In the 1950s, the United Kingdom and France acquired nuclear weapons in part because membership of the "nuclear club" ensured these countries great power status. As Lord Cherwell argued at the time,

> [i]f we are unable to make bombs ourselves and have to rely entirely on the United States army for this vital weapon we shall sink to the rank of a second-class nation, only permitted to supply auxiliary troops, like the native levies who were allowed small arms but not artillery.[7]

Although chemical weapons may not have the same prestige value as nuclear weapons, for developing countries unable to acquire a nuclear option CW may be an attractive alternative. Chemical weapons have long been characterised as "the poor man's weapon of mass destruction". Third World interest in acquiring CW may in part reflect this perception.

A second reason why Third World countries may develop an interest in chemical weapons is because they may believe that such weapons have military value. In the West, chemical weapons have generally been viewed as having relatively low military utility. On the battlefield, sudden changes in weather conditions can render the effects of chemical weapons use unpredictable. In addition, most Western military forces are equipped with protective gear such as gas masks and suits which are able to counter the effects of traditional chemical agents. Finally, Western forces have available to them conventional as well as nuclear weapons with equal or better military characteristics.

The military utility of chemical weapons may, however, be judged differently in the developing world, particularly in situations where predictability is less important, and where both chemical protection and sophisticated conventional and nuclear weapons are simply unavailable. As Ricardo Fraile, a Chemical and Biological Warfare (CBW) consultant, explains:

> The chemical weapons used by the Third World do not have to be sophisticated since the people they are used against do not have any protection. A simple gas like mustard gas can be very effective against men who do not have protective clothing.[8]

Every confirmed use of chemical weapons since the First World War has, in fact, involved a Third World country lacking chemical protection, and has shown CW to be effective both in military terms and in terms of its terror-inducing effects. This was true of the use of chemical weapons by Spain in Morocco in 1925, by the Soviet Union in China in 1934, by Italy in Ethiopia between 1935–36, by Japan in China between 1937–45, by Egypt in Yemen between 1963–67[9] and, more recently, by Iraq in the Gulf War.

Third World countries may therefore see CW as an effective means of accomplishing a number of different military missions. They can be used in counter insurgency operations to flush guerrillas out of hard to reach areas and to terrorise their domestic supporters. Chemical weapons can also be used to counter an adverary's superior conventional forces. For a country facing large concentrations of enemy troops, CW can be a vital force multiplier. They can also be used to paralyse enemy air power on the ground, rendering it vulnerable to follow on attacks with conventional high explosives. Chemical weapons can also be acquired for the traditional purpose of deterring enemy chemical use through the threat of retaliation in-kind. Finally, because of their potential for mass destruction, CW can serve as a counter to an adversary's nuclear capability.

In deciding whether to acquire chemical weapons, developing countries are likely to consider these types of political and military incentives.The CW policy decisions of Third World countries are also likely to be influenced by various moral, legal, and technical constraints. These constraints on the acquisition of CW may now, however, be breaking down.

In the West, chemical weapons have traditionally been viewed as particularly immoral and inhumane. The Romans, for example, are said to have decreed "'Armis bella non veneris geri,' war is waged with weapons, not with poisons".[10] In 1855, Lord Dundonald's plan to use poison sulphur in the Crimean War was rejected on the grounds that the "effect of the chemical weapon is so horrible that no honourable combatant can use it".[11] But it was the First World War, in which some 113,000 tons of chemical agents resulted in an estimated 1.3 million gas casualties,[12] that really crystallised Western revulsion to poison gas. Although Third World countries did not share this particular experience, a number of them did, as noted earlier, fall victim to chemical attacks in subsequent years. Third World interest in chemical weapons, like that in much of the West, might therefore be dampened by the moral revulsion arising from these earlier experiences.

It is possible, however, that the example set by the United States and the Soviet Union in the CW area might be eroding this longstanding moral constraint. Interestingly enough, the US Arms Control and Disarmament Agency opposed new US chemical weapons production in 1974 partly out of concern about the effect of such a step on CW proliferation. As Fred Ikle, the Director of ACDA, explained at the time,

> If we start on a new type of production program . . . such an effort, particularly if it became large-scale, might stimulate third countries to make new efforts in the production of chemical weapons, a type of weapon which could be adversely used against our allies, our friends, or even us, and where the technology is not all that difficult to obtain for a large number of countries.[13]

In December 1987, the United States began to produce chemical weapons again for the first time since 1969. Although General Secretary Mikhail Gorbachev announced the cessation of Soviet chemical weapons production in April 1987, the Soviet Union is believed to have maintained an active CW production programme throughout the 1970s and 1980s.[14] This programme may have influenced Third World thinking about the morality of chemical weapons. The new US CW production programme may have a similar effect.

International law may provide a second possible constraint on CW proliferation in the developing world. The 1925

Geneva Protocol bans the wartime use of chemical as well as biological weapons, but not the development, production, possession, or transfer of such weapons. Over 100 countries, many of whom are from the developing world, are parties to this agreement.[15] A number of Third World countries are also participating in negotiations in Geneva aimed at banning chemical weapons.

Both the Geneva Protocol and the longstanding effort to ban chemical weapons may have helped hinder Third World CW proliferation by underscoring that the use of such weapons was immoral and inhumane, by inspiring confidence that others were not acquiring chemical weapons, and by raising the political costs of pursuing a CW capability. But the international response to Iraq's repeated use of chemical weapons may have weakened the constraints on CW use embodied in international law and, by implication, on CW proliferation, as well. As was noted earlier, the UN confirmed in 1984 that chemical weapons were being used in the Gulf War. Not until 1986, however, did the UN officially identify Iraq as the guilty party. Baghdad's war effort, moreover, continued to receive support from the Soviet Bloc, France, China, and Egypt, all of whom provided substantial quantities of conventional arms to Iraq.[16]

In the past, technological barriers have served as a third constraint on the ability of Third World countries to develop chemical weapons. But these technological barriers have been gradually lowered as the industrialisation/modernisation process has brought petrochemical, pesticide, fertilizer, and pharmaceutical industries to the developing world. Any country with such industries has the potential, in terms of equipment, raw materials, and expertise, to produce some chemical warfare agents. Moreover, because much of the equipment and many of the chemicals that can be used to make chemical warfare agents have legitimate commercial uses, countries without such facilities can readily acquire the necessary components on the international market. Of course, technological barriers can be overcome most easily by the direct transfer of chemical weapons from a possessor state.

Third World countries may thus have both political and military incentives for acquiring chemical weapons, and may also face fewer moral, legal, and technical constraints on such acquisition than was previously the case. This does not mean, however, that all developing countries will necessarily acquire chemical weapons. For a majority of these states, the incentives to acquire CW either do not exist or are outweighed by existing constraints, however weakened the latter may have become. Only in a relatively limited number of Third World countries, therefore, has the combination of strong incentives and diminishing constraints appeared to produce a decision to acquire chemical weapons. These countries are considered below.

THE EXTENT OF THE CW PROLIFERATION PROBLEM

Any effort to explore the nature and extent of the CW proliferation problem in the develping world is hampered by the reluctance of most governments to identify specific chemical weapons states. Instead, government officials speaking on the record have tended to characterise the problem in terms of the *number* of such states. However, even these numerical estimates are imprecise and somewhat contradictory.

In June 1987, the head of the Soviet delegation to the Conference on Disarmament suggested that there were between nine and 15 countries with chemical weapons. One year earlier, the official Soviet news agency, TASS, reported that 13 to 15 countries had chemical weapons.[17] In the United Kingdom, on the other hand, government ministers stated in 1986 that possibly more than 20 countries either had chemical weapons or were considering acquiring them. In 1985, a government minister told the House of Lords that more than 12 states were believed to possess chemical weapons, compared to about six a decade earlier.[18] In the United States, the Director of the Arms Control and Disarmament Agency stated in 1987 that at least 15 states possessed chemical weapons, with others attempting to acquire them.[19] One year earlier, the US Army Chief of Staff and an official in the Office of the Secretary of Defense offered differing estimates: the former referred to 14 chemical weapons states with two others possible; the latter stated that 16 countries had chemical weapons, and six more were probable.[20] All of these estimates are believed to include both Third World countries and members of NATO and the Warsaw Pact.[21]

In addition to being imprecise and somewhat contradictory, official government statements generally do not explain how they *define* a chemical weapons state.[22] Do they distinguish, for example, between countries with chemical weapons research programmes and those with a militarily useful chemical weapons capability? If so, what *is* a military useful CW capability? Does it involve access to a certain quantity of chemical weapons, or of certain chemical agents? Finally, do official statements distinguish between those countries with chemical weapons under national control, and those with foreign chemical weapons deployed on their territory?

One possible reason why most governments do not identify CW possessor states and are not more specific in discussing capabilities is because they may be uncertain about precisely who does in fact have what capability. As was noted earlier, any country with a commercial chemical industry has the ability to produce some chemical warfare agents. Moreover, without direct access to such facilities, it is probably impossible to know whether activities being undertaken are of a commercial or military nature. Equipment and chemical feedstock purchases on the international market may not reveal much either, as they could either be for commercial or military purposes. Finally, even chemical delivery systems don't have distinctive features. An artillery shell, bomb, or missile warhead carrying a chemical warfare agent looks essentially the same as one carrying conventional high explosives.

Despite these difficulties, it is possible to explore the nature and extent of the Third World CW proliferation problem using publicly available information. In the discussion which follows, this information is organised according to specific criteria. It should be emphasised, however, that these criteria are merely a tool for organising the available information on CW proliferation, and that conclusions derived from them about the CW status of particular countries are based largely on this information. The criteria used in this discussion are as follows:

☐ *Known* CW states are those who have either declared that they possess chemical weapons or whose use of such weapons has been definitively confirmed.

☐ *Probable* CW states are those reported by NATO or Western government officials, on or off the record, as producing chemical weapons, possessing chemical weapons under national control, or using chemical weapons.

☐ *Seeking to possess* CW states are those reported by NATO or Western government officials, on or off the record, as trying to acquire chemical weapons.

☐ *Doubtful* CW states are those reported, generally by domestic or foreign adversaries, as possessing CW under national control or of using chemical weapons, with no confirmation by NATO or Western government officials.

On the basis of these criteria, Iraq is the only Third World country known to possess chemical weapons.[23] Eleven other Third World countries are probable CW states. The CW capabilities of seven of these countries have been mentioned in press reports citing US government officials speaking on the record. They include Burma,[24] China,[25] Iran,[26] North Korea,[27] Syria,[28] Taiwan,[29] and Vietnam.[30] The four remaining countries, Egypt,[31] Ethiopia,[32] Israel,[33] and Libya,[34] have been discussed in press reports citing unnamed US government officials and classified documents. South Korea has been identified by unnamed US government officials as a country seeking to possess chemical weapons.[35]

At least 18 other countries have been accused of either possessing or using chemical weapons, but there has been no confirmation of these claims, either on or off the record, by NATO or Western government officials. These doubtful chemical weapons states include Afghanistan,[36] Angola,[37] Argentina,[38] Chad,[39] Chile,[40] Cuba,[41] El Salvador,[42] Guatemala,[43] India,[44] Indonesia,[45] Laos,[46] Mozambique,[47] Nicaragua,[48] Pakistan,[49] Peru,[50] the Philippines,[51] South Africa,[52] and Thailand.[53]

It is difficult to know with any certainty why Iraq, the 11 probable CW states, and South Korea might have decided to acquire chemical weapons. Nevertheless, it is possible to draw some conclusions, however tentative, about the role of political and military incentives in the CW policy decisions of these countries based on publicly available information.

It would appear that none of these Third World countries acquired chemical weapons for reasons of political prestige. In order for chemical weapons to have *political* value as the "poor man's weapon of mass destruction", possessor status would have to be known *and* acknowledged by the country concerned. Yet even Iraq did not openly acknowledge its CW activities until July 1988.[54] Indeed, many Third World countries have emphasised just the opposite—that they do not possess chemical weapons. Among the probable CW states that have denied possession, are Burma, China, Egypt, Ethiopia, and Israel. Doubtful CW states that have denied possession include India, Indonesia, Pakistan, Peru, and the Philippines. This suggests that chemical weapons do not have the same sort of prestige value as nuclear weapons, and that decisions in the Third World to acquire chemical weapons are based largely on military rather than political incentives.

As noted earlier, Third World countries may view the military utility of chemical weapons differently than Western states. In at least five countries, chemical weapons may have been acquired for use in counter insurgency operations in their own or neighbouring states. Iraq's initial decision to obtain chemical weapons may have been related to its long history of problems with its Kurdish population. Burma is said to have acquired chemical weapons to quell domestic insurgents.[55] Egypt used chemical weapons during its intervention in the civil war in Yemen in the 1960s.[56] Ethiopia has had a longstanding problem with Eritrean secessionists. Finally, Vietnam has been accused by the US of using the so-called yellow rain mycotoxins and other unidentified chemical agents against the Hmong in neighbouring Laos and against resistance forces in Kampuchea.[57]

Third World countries facing superior conventional forces also have a powerful incentive for acquiring chemical weapons. Iraq's more recent chemical weapons programme is clearly a response to the Iranian human wave attacks in the Gulf War. The Egyptian and Syrian CW efforts may be related to Israel's conventional superiority, particularly its highly effective air force. Ethiopia may value chemical weapons for use in its longstanding conflict with Somalia over the Ogaden. Libya is reported to have acquired and used chemical weapons in its war with neighbouring Chad.[58] North Korea may have obtained chemical weapons for use against South Korean and US conventional forces. Taiwan's chemical weapons are reportedly designed to thwart an invasion from mainland China.[59] Finally, Vietnam is reported to have used chemical weapons in 1979 against Chinese intervention forces.[60]

At least four countries in the Third World may have acquired chemical weapons in order to deter enemy chemical use through the threat of retaliation in kind. Reports that China suffered chemical attacks during border skirmishes with the Soviet Union in 1969 and during its intervention in Vietnam in 1979 suggest a strong motive for a Chinese CW programme.[61] Iran has almost certainly acquired chemical weapons in response to Iraqi CW use in the Gulf War. Israel is reported to have obtained chemical weapons in the 1970s in response to the CW threat from its Arab neighbours, particularly Egypt.[62] South Korea's efforts to acquire chemical weapons are probably linked to the CW programme of its chief rival, North Korea.

Finally, at least some Third World countries may have acquired chemical weapons in order to counter an adversary's nuclear capability. Israel's alleged nuclear programme, for example, may have stimulated the CW efforts of a number of Arab countries, including Iraq, Egypt, and Syria.[63]

Iraq, South Korea, and the 11 probable CW states may thus have had a variety of military incentives for acquiring chemical weapons. These military incentives probably outweighed existing moral and legal constraints on CW proliferation which, as was suggested earlier, may have weakened in recent years. Third World CW armament programmes probably have been helped even more by the erosion of technological barriers to CW acquisition.

As was noted earlier, Third World countries interested in acquiring chemical weapons can either bypass the technological problems altogether by procuring such weapons from other CW states, or can seek to develop their own chemical weapons production capability by purchasing the necessary equipment and chemicals on the international market. US intelligence officials have acknowledged the role of commercial firms in Third World CW programmes.[64] But the United States has often emphasised the former route to proliferation, identifying Soviet training, technical assistance, and chemical weapons transfers to allies in the developing world as a key factor in the proliferation problem. In 1984, for example, columnist Jack Anderson reported that the CIA had concluded that "Soviet military assistance has been a common source and major stimulus to the momentum of chemical weapons proliferation in the Third World".[65] General Secretary Gorbachev has denied the US charges, stating that the Soviet Union has not transferred chemical weapons to anyone, has not deployed them in the territory of other states, and "has always strictly abided by those principles in its practical policies".[66]

Information attributed to Western government officials suggests that Iraq, South Korea, and the 11 probable CW states may have benefited from both Soviet and commercial assistance. The Soviet role has almost certainly been overstated, however, as indigenous production programmes, relying largely on equipment and chemicals purchased from

Western firms, have been reported for a majority of these states.

Five Third World countries may have previously received chemical weapons directly from the Soviet Union. These include Egypt,[67] Ethiopia,[68] Libya,[69] Syria[70] and Vietnam[71]. Chemical weapons and technical assistance may also have been provided by one Third World country to another. Syria is reported to have helped the Iranian CW effort,[72] Iran is said to have supplied chemical weapons to Libya in return for Soviet-made mines,[73] while Israel is reported to have provided chemical agents to Taiwan, and advice on CW matters to the Chinese.[74] A majority of these countries, however, are now said to possess indigenous chemical weapons production capabilities, often developed with equipment and chemicals purchased from Western companies. These include Iraq,[75] Burma,[76] China,[77] Iran,[78] Israel,[79] Libya,[80] North Korea,[81] Syria,[82] Taiwan,[83] and Vietnam[84]. Egypt may also have its own CW production capability.[85]

A number of conclusions emerge from this discussion of publicly available information on CW proliferation in the developing world. First, Iraq is the only known CW state, although 11 other countries are probable CW states, and South Korea might be seeking to possess chemical weapons. The CW status of 18 other countries is doubtful. Second, Third World countries that may have acquired chemical weapons have done so largely for military rather than political reasons. Finally, a majority of the countries that are reported to have acquired chemical weapons appear to have done so through indigenous production programmes based on equipment and chemicals purchased from Western companies. The Soviet role in the Third World proliferation problem has thus almost surely been overstated.

These conclusions, it must be acknowledged, are derived from criteria that are far from ideal. Laos, for example, has been accused by the US government of using yellow rain and other unidentified chemical agents. However, because the reports of yellow rain warfare have been shown to be unreliable,[86] Laos has been classified here as a doubtful, rather than a probable, CW state. In addition, particular emphasis has been given to reports involving NATO and Western government officials, speaking on or off the record, and to reports said to be based on classified information. If these reports are incorrect, the conclusions, derived from them will be similarly flawed.

The problem of credible sources is not necessarily helped by multiple press reports containing the same basic information. Two of the most detailed accounts of the proliferation problem, by Oberdorfer and Ember, draw heavily from an earlier report, by the columnist Jack Anderson, purportedly based on intelligence sources and classified documents. Other reports may also be derived from the same initial source or report, so the possibility of erroneous information being unintentionally perpetuated cannot be overlooked.

It is also possible that false or exaggerated reports of CW proliferation may be propagated intentionally.[87] CW possession or use charges can be useful for discrediting a domestic or foreign adversary. Many of the claims concerning doubtful CW states probably fall in this category. CW proliferation fears can also help increase demand for chemical protective equipment. Finally, concern about CW proliferation can be used to increase support for national CW armament programmes.

Without access to intelligence information, it is impossible to know exactly how extensive the CW proliferation problem in the developing world really is. Moreover, judging from the official government statements noted earlier, even with access to intelligence information, it may still be impossible to know precisely who has what capability. In some respects, however, this may no longer matter. It is now widely believed that chemical weapons are spreading to more and more countries. This perception of a growing CW proliferation problem has been driving national as well as international policy.

NATIONAL AND INTERNATIONAL RESPONSES

Evidence in 1984 that Iraq's chemical weapons had been produced with chemicals and equipment purchased from Western chemical companies stimulated both national and international efforts to control the sale of the relevant chemicals and technology. In March 1984, the United States banned the sale to both Iraq and Iran of five chemicals that could be used to manufacture mustard and nerve gases.[88] Two years later, the United States extended its list of controlled chemicals and added Syria to the ban, following reports that Syria had begun to produce chemical weapons and had discussed cooperation in the field with Iran.[89] In 1987, the United States added an additional eight chemicals to its export control list for Iraq, Iran and Syria, in response to information that these countries had altered their purchasing policies to evade existing controls. At the same time, the US extended its 1984 export control list to all but 18 Western industrialised countries, out of concern about the wider proliferation problem.[90]

Other governments, including those of Australia, Canada, Japan, the Netherlands, Denmark, the Republic of Ireland and the United Kingdom also imposed export controls on a variety of different chemicals in the spring and summer of 1984.[91] The Federal Republic of Germany also adopted chemical export controls in the spring of 1984 and, a few months later, placed controls on a wide range of equipment that could be used to produce chemical weapons, following reports linking a West German built pesticide plant to Iraqi efforts to produce nerve agents.[92] Chemical export controls were also approved by the European Community in 1984, thus providing the first multilateral response to the problem of CW proliferation.[93] In January 1986, the Soviet Union imposed export controls on nine chemicals and one chemical group that could be used to make chemical warfare agents.[94] Relevant members of the Council for Mutual Economic Assistance (CMEA) are reported to have met in June 1987 to discuss similar steps.[95]

One glaring weakness in these early national non-proliferation efforts was that countries tended to include different chemicals in their export control lists. In March 1985, the US Secretary of State, George Shultz, called for multilateral as well as bilateral efforts to curb exports of chemicals that could be used to make chemical weapons.[96] A few months later, Australia took the lead in coordinating national export control policies, hosting the first in a series of meetings of Western industrialised states.[97]

At its first meeting in June 1985, the so-called Australian Group included the 10 member states of the European Community, plus Australia, Canada, Japan, New Zealand, and the United States.[98] By September 1987, its membership had grown to 20, the newcomers being Portugal, Spain, Norway, Switzerland, and the European Commission itself. Perhaps more importantly, the Group had succeeded in developing a uniform list of chemicals to be controlled by all member states. Formal export licences are now required for eight specific chemicals, and a warning list of over 30 other chemicals has been circulated to private chemical companies in the hope that they will cooperate with government agencies in controlling the sale of these substances.[99]

In the autumn of 1985, the Soviet Union began to express an interest in working with the United States to halt the spread of chemical weapons.[100] This culminated in a promise, at the Reagan–Gorbachev summit in November 1985, that the two sides would "initiate a dialogue on preventing the proliferation of chemical weapons".[101] US officials hoped that this dialogue would lead to a cooperative relationship similar to the longstanding US–Soviet effort to prevent nuclear proliferation. In early 1986, Kenneth Adelman, the Director of the US Arms Control and Disarmament Agency, suggested that the two sides should harmonise export controls on chemicals and equipment to problem countries in the Third World, as well as share intelligence information on such countries.[102]

At least initially, the Soviet Union was interested in a much more specific bilateral effort. Shortly before the November 1985 Reagan–Gorbachev summit, the General Secretary advanced the "thought" that the two sides could develop a treaty to curb the spread of chemical weapons, just as they had concluded a treaty to halt the spread of nuclear weapons.[103] A few months later, in a major foreign policy address, Gorbachev proposed the idea of a chemical non-proliferation treaty as an interim step prior to the conclusion of a chemical weapons ban.[104] The United States rejected the Soviet proposal, arguing that the most effective means of halting CW proliferation was by concluding a ban on such weapons. As the US State Department spokesman, Bernard Kalb, explained,

> We believe that an effective and verifiable global ban on all chemical weapons is the way to solve the triple problems of existing chemical weapons capabilities, their use, and their further spread.[105]

A chemical non-proliferation treaty probably was not, therefore, on the agenda of the US–Soviet CW non-proliferation discussions held in 1986 and 1987. Whether the two sides achieved progress in the areas suggested earlier by the United States is not publicly known.[106]

Neither the chemical export controls promoted largely by Western industrialised states nor the chemical non-proliferation treaty suggested by the Soviet Union provide a solution to the problem of chemical weapons proliferation in the developing world. Export control policies will not prevent countries that already possess civil chemical industries from developing at least some chemical warfare agents. Moreover, it is impossible to control all of the chemicals that could be used to produce chemical warfare agents, as many have legitimate commercial uses. Finally, a determined state may be able to evade export controls entirely, either by setting up front companies, or by dealing with unscrupulous chemical traders or manufacturers.[107] Chemical export controls will not, therefore, prevent a country that really wants chemical weapons from acquiring them. At best, export controls will make it more difficult and costly for the potential proliferator to acquire chemical weapons, and may provide supplier countries with early warning of such proliferation. Or as a US government official acknowledged in 1984, chemical export controls

> can achieve valuable objectives, such as the disruption of a given state's plans to produce CW quickly for immediate use in battle and the imposition of higher economic costs on such a state. But no export control policy can erect an insurmountable barrier against acquisition or at-home production of CW.[108]

Verification and, more importantly, political obstacles rule out a chemical non-proliferation treaty as a solution to the problem of CW proliferation. Developing countries oppose the creation of another discriminatory, Nuclear Non-proliferation Treaty type of arrangement, which would allow existing members of the chemical club to retain their chemical weapons, but would prohibit the "have-nots" from acquiring them. Western countries view efforts to conclude such an agreement as a distraction from the negotiations in Geneva aimed at banning chemical weapons. As the US Ambassador to the Geneva negotiations, Donald Lowitz, explained in 1986: "the focus of our efforts is and must remain a comprehensive agreement that eliminates forever the scourge of these terrible weapons".[109] A West German official agreed, noting that "[p]roliferation will be halted when countries can verify and control the global production of chemical weapons".[110]

Third World countries may be reluctant, however, to abandon their chemical weapons capabilities and participate in a CW disarmament agreement if security corners have prompted them to acquire chemical weapons. As the British Foreign Secretary, Sir Geoffrey Howe, told the third UN special session on disarmament in June 1988,

> disarmament cannot proceed in a vacuum . . . It is inextricably tied up with security. No one is going to discuss disarmament seriously if he already feels insecure.[111]

Third World countries that have acquired CW must therefore be convinced that their security interests can be met by means other than chemical weapons.

CONCLUSIONS/IMPLICATIONS

In the absence of a chemical weapons ban encompassing all CW states, the proliferation of chemical weapons, particularly in the developing world, is likely to have profound implications. As chemical weapons become more fashionable, various sub-national groups, including terrorist organisations, may become more interested in acquiring a CW capability.[112] With a basic knowledge of chemistry and a small amount of money, such groups can easily produce enough chemical agent to threaten an average-size city. Research quantities of ready made agents such as mustard gas can also be purchased directly from some chemical manufacturers.[113] Opportunities to steal chemical weapons may also increase as more and more countries acquire them. Finally, sub-national groups might also obtain chemical weapons directly from states such as Libya and Iran who are sympathetic to their political aspirations.

At the national level, the spread of chemical weapons may lead to further proliferation in three ways. First, non-CW states may move to acquire chemical weapons in response to the CW threat posed by neighbouring states. In addition, chemical weapons may increasingly be seen as a legitimate means of countering conventional military threats, either domestic or foreign. Finally, proliferation may lead to chemical weapons being transferred more freely between states, and hence to further proliferation.

CW proliferation could also make conflict itself more likely, particularly in unstable regions. Following confirmation of Iraq's use of chemical weapons in the Gulf War, there were reports that the United States had examined the feasibility of air strikes against Iraqi CW sites.[114] More recently, Israel was reported to be considering a pre-emptive strike against a Syrian installation said to be developing nerve agent warheads for SS–21 and SCUD missiles.[115] Either of these strikes could have led to a military confrontation between the countries involved.

CW proliferation could also make conflict more destructive, particularly in areas such as the Middle East and Asia, where ballistic missiles are also proliferating. During the Gulf War, Iraq and Iran used conventionally armed missiles in their attacks on each other's cities. In the final months of the war, however, Iraq reportedly threatened to launch chemical strikes against large Iranian cities.[116] At least seven other probable CW states also possess ballistic missiles which could be modified to carry chemical warheads, including China, Egypt, Israel, Libya, North Korea, Syria, and Taiwan. South Korea also has a conventional ballistic missile capability.[117] The use of chemically armed ballistic missiles by any of these countries would lead to unprecedented destruction. Moreover, if chemically armed ballistic missiles were used against Israel, it would almost certainly trigger a nuclear response.

The proliferation of chemical weapons, and of sophisticated delivery means such as ballistic missiles, also has implications for the Superpowers themselves. With such military power in the hands of Third World countries, both the United States and the Soviet Union will find it increasingly difficult to pursue their regional interests. Moreover, the use of chemically armed ballistic missiles in a region like the Middle East could draw the Superpowers in on the side of their respective allies, culminating in conflict between East and West as well.[118]

The West, thus, has a clear interest in halting the spread of chemical weapons in the developing world. Although the identities and capabilities of CW possessor states may still be unclear, Iraq's acquisition and repeated use of chemical weapons provides firm evidence of a Third World CW proliferation problem. Chemical export controls are of limited value in preventing developing countries from acquiring indigenous CW production capabilities. A ban on chemical weapons could go a long way toward solving the proliferation problem, but only if all existing CW states can be convinced that their security interests can be met by means other than chemical weapons. If countries like Iraq refuse to participate in the chemical weapons ban, the treaty's non-proliferation objectives will not be realised, and other countries may not agree to ratification. CW proliferation in the developing world may thus make the elimination of chemical weapons both more urgent and, at the same time, more difficult to achieve.

NOTES

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[1] For the various UN Security Council reports investigating the use of chemical weapons in the Gulf War, see S/16433 of 26 March 1984, S/17911 of 12 March 1986, and S/18852 of 8 May 1987, S/19823 of 25 April 1988, S/20060 of 20 July 1988 and S/20063 of 25 July 1988

[2] John H. Cushman, Jr., "US Suspects Toxic Arms Development," *International Herald Tribune*, 5 May 1988.

[3] See, for example, Geoffrey Kemp, "Mideast Missile Madness: A Bazaar for Doomsday," *Washington Post*, 27 March 1988; and David Ottaway, "In Mideast, Warfare Takes a New Turn," *Washington Post*, 5 April 1988.

[4] US Senate, Committee on Foreign Relations and Subcommittee on Energy, Nuclear Proliferation and Government Processes of the Committee on Governmental Affairs, *Joint Hearing on Chemical Warfare: Arms Control and Nonproliferation*, 98th Cong., 2nd Sess. Washington, DC, US Government Printing Office, 1984, p. 34.

[5] See, for example, J.P. Perry Robinson, "Some Developments Over the Past Year in the Field of Chemical Warfare Armament," Appendix to Background Paper No. 7, 13th Workshop of the Pugwash Study Group on Chemical Warfare, Monitoring a Chemical Weapons Treaty, Geneva, Switzerland, 23–24 January 1988.

[6] Many of the ideas reflected here are drawn from US House of Representatives, Subcommittee on International Security and Scientific Affairs of the Committee on Foreign Affairs, *Report on Binary Weapons: Implications of the US Chemical Stockpile Modernisation Program for Chemical Weapons Proliferation*, 98th Cong., 2nd Sess. Washington, DC: US Government Printing Office, 1984, pp. 18–27.

[7] As cited in Margaret Gowing, *Independence and Deterrence: Britain and Atomic Energy, 1945–52 Volume I Policy Making*, London, Macmillan, 1974, p. 407.

[8] As cited in William E. Smith, "Clouds of Desperation," *Time*, 19 March 1984, p. 6

[9] Stockholm International Peace Research Institute, *World Armaments and Disarmament, SIPRI Yearbook 1982* London: Taylor & Francis Ltd., 1982, p. 336 (hereafter cited as *SIPRI Yearbook*, with appropriate year). See also, Stockholm International Peace Research Institute, *The Problem of Chemical and Biological Warfare, Vol. I, The Rise of CB Weapons*, Stockholm/Almqvist & Wiksell, 1971, pp. 142–52, 159–61.

[10] As cited in Dr. A.J.J. Ooms, "What makes chemical weapons so peculiar?" in *The Holmenkollen Report on the Chemical Weapons Convention*, Oslo, Royal Norwegian Ministry of Foreign Affairs, 1987, p. 32.

[11] As cited in A. Jack Ooms, "Chemical Weapons: Is Revulsion a Safeguard?" *Atlantic Community Quarterly*, Vol. 24, No. 2, Summer 1986, p. 157.

[12] These figures are drawn from SIPRI, *The Problem of Chemical and Biological Warfare, Vol. I, The Rise of CB Weapons*, pp.128–29.

[13] US House of Representatives, Special Subcommittee on Arms Control and Disarmament of the Committee on Armed Services, *Hearings on the Review of Arms Control and Disarmament Activities*, 93rd Cong., 2nd Sess. Washington, DC, US Government Printing Office, 1974, p. 9.

[14] For the Gorbachev statement, see "Speech by Mikhail Gorbachev at Friendship Rally," Soviet TV, 10 April 1987 as reprinted in SWB–EE/8541, 13 April 1987. For a US view on the Soviet programme, see US Defense Intelligence Agency, Directorate for Scientific and Technical Intelligence, *Soviet Chemical Weapons Threat*, Washington, DC, Defense Intelligence Agency, 1985 DST–1620F–051–85, p. 9.

[15] The text and list of Parties to the Geneva Protocol may be found in US Arms Control and Disarmament Agency, *Arms Control and Disarmament Agreements*, Washington, DC, Arms Control and Disarmament Agency, 1982, pp. 14–18.

[16] See, Anthony H. Cordesman, *The Impact of Arms Transfers on the Iran/Iraq War*, Whitehall Paper London, Royal United Services Institute for Defence Studies, 1987, pp. 6, 12, 17.

[17] "Nazarkin Views Chemical Weapons Convention Prospects," *Komsomolskaya Pravda*, (in Russian) 16 June 1987 as reprinted in FBIS–SU, 22 June 1987; and "US Role in Chemical Weapons Ban Reviewed," *Tass*, (in English) 9 April 1986 as reprinted in FBIS–SU, April 1986.

[18] "Speech by Mr Tim Renton MP, Minister of State for Foreign and Commonwealth Affairs of the United Kingdom of Great Britain and Northern Ireland to the Conference on Disarmament," 15 July 1986, Hansard (Commons), 16 December 1986, col 500; and Hansard (Lords) 24 April 1985, col 1178.

[19] Kenneth L. Adelman, "USA's Need for a Chemical Deterrent," ACDA Occasional Papers, Number 2, 11 February 1987, p. 1.

[20] US House of Representatives, Subcommittee on Defense of the Committee on Appropriations, *Hearings on Department of Defense Appropriations for 1987*, 99th Cong., 2nd Sess., Washington, DC, US Government Printing Office, 1986, Part 1, p. 114, and US Senate, Subcommittee on Strategic and Theater Nuclear Forces of the Committee on Armed Forces, *Hearings on the Department of Defense Authorization for Appropriations for Fiscal Year 1987*, 99th Cong., 2nd Sess., Washington, DC, US Government Printing Office, 1986, Part 4, p.1730.

[21] Within the two military alliances, the United States, the Soviet Union, and France are known CW states. Czechoslovakia, the German Democratic Republic, Romania, and Poland can be classified as probable CW states, on the basis of press reports citing unnamed NATO and Western government officials. See, Don Oberdorfer, "Chemical Arms Curbs Are Sought," *Washington Post*, 9 September 1985, "Welt Am Sonntag Says Warsaw Pact States Producing Poison Gas," *Radio Free Europe*, 2 March 1986, and Robert C. Toth, "Germ, Chemical Arms Reported Proliferating," *Los Angeles Times*, 27 May 1986. See also Karl Feldmeyer, "Der Warschauer Pakt übt mit scharfer chemischer Munition," *Frankfurter Allgemeine Zeitung*, 19 August 1985, and "CDU/CSU Spokesman on USSR Chemical Weapons," Hamburg *DPA*, (in German) 12 August 1985 as reprinted in FBIS–WE, August 1985.

[22] One notable exception may be found in a 1986 interview with Kenneth Adelman, the Director of the US Arms Control and Disarmament Agency. Adelman said that stockpile size is "sufficient so that it could give a military utility to the possessing country, and sufficient to cause a great deal of damage to the other side. We are not talking about experimental possession, research possession." He also said that in the main, Third World countries have purchased rather than produced chemical weapons, and that the most widely possessed agent was mustard gas, although nerve gas and incapacitants were also stockpiled. See, Lois Ember, "Worldwide Spread of Chemical Arms Receiving Increased Attention," *Chemical and Engineering News*, 14 April 1986, p. 13.

[23] Robert J. McCartney, "Iraqi Official Acknowledges Chemical-Arms Use in War," *International Herald Tribune*, 2–3 July 1988, and "US Says Iraq Uses Chemical Weapons in War with Iran," *International Herald Tribune*, 6 March 1984.

[24] "Statement by Rear Admiral William O. Studeman, US Navy, Director of Naval Intelligence, before the Seapower and Strategic and Critical Materials Subcommittee of the House Armed Services Committee, on Intelligence Issues," 1 March 1988, p. 48. For other reports based on information from US government sources, see Oberdorfer, "Chemical Arms Curbs Are Sought"; and Ember, "Worldwide Spread of Chemical Arms Receiving Increased Attention," p. 9.

[25] Studeman Statement, 1 March 1988, p. 48. For other reports based on information from US government sources, see "China and Israel," *Foreign Report*, 12 July 1984; and Jack Anderson, "The Growing Chemical Club," *Washington Post*, 26 August 1984.

[26] "US Says Iran May Use Chemical Arms," *International Herald Tribune*, 26 April 1985; Tom Diaz, "Syria said to have offered chemical weapons to Iran," *Washington Times*, 9 December 1985; and William Beecher, "US seeking action to halt chemical arms spread," *Boston Globe*, 4 February 1986.

[27] Studeman Statement, 1 March 1988, p. 48. See also the comments by US Secretary of Defense Caspar Weinberger in Rick Atkinson, "Weinberger Maintains Opposition to Dutch Plan for Cruise Missiles," the *Washington Post*, 13 May 1984, and the testimony of the US Army Chief of Staff General John A. Wickham, Jr., in US House of Representatives, Subcommittee on Defense of the Committee on Appropriations, *Hearings on Department of Defense Appropriations for 1986*, 99th Cong., 1st Sess., Washington, DC, US Government Office, 1985, Part 2, p. 85. For a later report on what was said to be secret testimony to the Congress by General Wickham, see Chuck Vinch, "US: N. Korea has chemical arms," *Pacific StArs & Stripes*, 30 June 1986.

[28] Diaz, "Syria said to have offered chemical weapons to Iran." For other reports based on information from US government sources, see Oberdorfer, "Chemical Arms Curbs Are Sought"; and Gaylord Shaw, "Syria Reported to be Making Chemical Arms," *Los Angeles Times*, 26 March 1986.

[29] Studeman Statement, 1 March 1988, p. 48. For other reports based on information from US

government sources, see "China and Israel"; and Oberdorfer, "Chemical Arms Curbs Are Sought."

[30] US Department of State, "Chemical Warfare in Southeast Asia and Afghanistan," Report to the Congress from Secretary of State Alexander M. Haig, Jr., 22 March 1982, Special Report No. 98 (hereafter cited as *The Haig Report*); and US Department of State, "Chemical Warfare in Southeast Asia and Afghanistan. An Update," Report from Secretary of State George P. Shultz, November 1982, Special Report No. 104 (hereafter cited as *The Shultz Report*).

[31] Richard Halloran, "US Finds 14 Nations Now have Chemical Arms," *New York Times*, 20 May 1984; and Anderson, "The Growing Chemical Club".

[32] Anderson, "The Growing Chemical Club"; and Ember, "Worldwide Spread of Chemical Arms Receiving Increased Attention," p. 9.

[33] "China and Israel"; and Anderson, "The Growing Chemical Club".

[34] Michael Gordon, "US and Soviet to Meet Again on Curbing Chemical Weapons," *New York Times*, 26 August 1986; and Elaine Sciolino, "US Sends 2,000 Gas Masks to the Chadians," *New York Times*, 25 September 1987.

[35] Oberdorfer, "Chemical Arms Curbs Are Sought"; and Ember, "Worldwide Spread of Chemical Weapons Receiving Increased Attention," p. 9.

[36] The Haig Report refers to "*some evidence* that Afghan Government forces *may* have used Soviet supplied chemical weapons against the *mujahidin* even before the Soviet invasion." Emphasis added. *The Haig Report*, p. 6.

[37] Paul Moorcroft, "A new heart for the UNITA army," *Jane's Defence Weekly*, 13 September 1986; and James Morrison, "Angola again tied to use of nerve gas," *Washington Times*, 11 March 1988.

[38] "Argentine 'Gas Shells' Found in Falklands," *Daily Telegraph*, 18 August 1982.

[39] *TASS*, 21 April 1986, as reported in FBIS—SU, 25 April 1986, cited in *Arms Control Reporter, 1986*, p. 704.B.172.

[40] D. Shribman, "FBI learns Chilean plot to kill Letelier in '76 involved nerve gas," *New York Times*, 14 December 1981 and *Krasnaya Zvezda*, 18 August 1984, both cited in *SIPRI Yearbook 1987*, p. 111 and note 32.

[41] David Wood, "Nicaragua has gear for waging chemical war, Pentagon says," *New Orleans Times–Picayune*, 5 December 1984.

[42] "Rights group charges massacre by El Salvador," *New York Times*, 13 August 1981.

[43] Havanna international radio, 6 July 1982, cited in *SIPRI Yearbook 1987*, p. 111 and note 36.

[44] Pierre Simonitsch, "Chemical Weapons: everyone has stocks, despite treaty," *Frankfurter Rundschau*, 29 August 1982 as reprinted in *The German Tribune*, 12 September 1982.

[45] "Chemicals claim," *Jane's Defence Weekly*, 24 August 1985.

[46] *The Haig Report*; and *The Shultz Report*.

[47] James Morrison, "Mozambique accused of chemical warfare," *Washington Times*, 31 December 1986.

[48] Wood, "Nicaragua has gear for waging chemical war, Pentagon says"; and *ACAN*, 16 February 1986 as reported in FBIS–LA, 18 February 1986, cited in *Arms Control Reporter, 1986*, p. 704.B.167.

[49] Jack Anderson, "Powderkeg fuse on our planet burning shorter," *Washington Post*, 3 December 1981, and "Phnom Penh says US gives Asian allies chemical weapons," *New York Times*, 14 April 1982, cited in *SIPRI Yearbook 1983*, p. 407 and note 164.

[50] H.G. Brauch, "Chemical Weapons: arsenals and recent developments," a paper presented at the Conference on Non Nuclear War in Europe, Groningen, 28 Nov–1 Dec 1984, cited in *SIPRI Yearbook 1987*, p. 111 and note 33.

[51] K. Dalton, "Manilla investigation into napalm bombing claim," *Times*, 26 September 1984, cited in *SIPRI Yearbook 1987*, p. 113 and note 39.

[52] UNHCR/WHO investigatory report, 1 June 1978 in UN Security Council document *S/13473*, 27 July 1979, cited in *SIPRI Yearbook 1987*, p. 111 and note 41; and Johannesburg *SAPA*, 3 September 1986 as reported in FBIS–ME, 4 September 1986, cited in *Arms Control Reporter, 1986*, p. 704.B.200.

[53] "Phnom Penh says US gives Asian allies chemical weapons," cited in *SIPRI Yearbook 1983*, p. 407 and note 164; and Kampuchean news agency statement as reported in FBIS–AP, 25 February 1985, cited in *Arms Control Reporter, 1985*, pp. 704.B.117–18.

[54] McCartney, "Iraqi Official Acknowledges Chemical-Arms Use in War." Two months earlier, the

Iraqi Foreign Minister had warned publicly that Iraq had to repel aggression by "all means, including the use of chemical weapons, against those who seek to occupy its territory." Patrick Tyler, "Iraq Seems to Abandon Diplomacy for Missiles," *International Herald Tribune*, 12 May 1988.

[55] Oberdorfer, "Chemical Arms Curbs Are Sought".

[56] M. Meselson and D.E. Viney, "The Yemen," in Steven Rose, ed., *CBW: Chemical-and Biological Warfare*, Boston, Beacon Press, 1969, pp. 99–102, and "China and Israel."

[57] *The Haig Report*; and *The Shultz Report*.

[58] Sciolino, "US Sends 2,000 Gas Masks to the Chadians"; and Michael Gordon, "US Thinks Libya May Plan to Make Chemical Weapons," *New York Times*, 24 December 1987.

[59] "China and Israel"; and Anderson, "The Growing Chemical Club."

[60] "China and Israel"; and Anderson, "The Growing Chemical Club."

[61] "China and Israel"; and Anderson, "The Growing Chemical Club".

[62] "China and Israel"; and Anderson, "The Growing Chemical Club".

[63] In this regard, see the comments by the former head of the Egyptian chemical warfare programme in "Arabs 'need chemical weapons,'" *Independent*, 28 July 1988.

[64] Tom Diaz, "Chemical weapons proliferation spurred by business, panel says," *Washington Times*, 10 May 1985; and Jack Anderson and Dale Van Atta, "Iran May Turn Chemical Tables on Iraq," *Washington Post*, 2 October 1985.

[65] Anderson, "The Growing Chemical Club".

[66] Soviet Embassy, Information Department, Press release, "Statement by Mikhail Gorbachev," Washington, 16 January 1986, p. 7.

[67] Anderson, "The Growing Chemical Club"; and "China and Israel".

[68] Anderson, "The Growing Chemical Club".

[69] Simon O'Dwyer-Russell, "Gaddafi arms Syria with gas warheads," *Sunday Telegraph*, 23 November 1986.

[70] Oberdorfer, "Chemical Arms Curbs Are Sought".

[71] *The Haig Report*; and *The Shultz Report*.

[72] Anderson and Van Atta, "Iran May Turn Chemical Tables on Iraq", and Beecher, "US seeking action to halt chemical arms spread."

[73] Sciolino, "US Sends 2,000 Gas Masks to the Chadians."

[74] "China and Israel."

[75] William Greer, "US Stops Chemicals Shipment to Iraq," *International Herald Tribune*, 2 April 1984; and Robert Harris, "The poor man's atom bomb," *The Listener*, 30 October 1986.

[76] Studeman Statement, 1 March 1988, p. 48; Oberdorfer, "Chemical Arms Curbs Are Sought"; and E.A. Wayne, "Tracking chemical weapons in the Gulf War," *Christian Science Monitor*, 13 April 1988.

[77] Studeman Statement, 1 March 1988, p. 48; and Anderson, "The Growing Chemical Club".

[78] Diaz, "Syria said to have offered chemical weapons to Iran"; and Harvey Morris, "Iran military wants to use chemical arms," *Independent*, 27 December 1987.

[79] Oberdorfer, "Chemical Arms Curbs Are Sought"; and Harris, "The poor man's atom bomb".

[80] Gordon, "US and Soviet to Meet Again on Curbing Chemical Weapons." See also, Gordon, "US Thinks Libya May Plan to Make Chemical Weapons".

[81] Studeman Statement, 1 March 1988, p. 48; and Atkinson, "Weinberger Maintains Opposition to Dutch Plan for Cruise Missiles."

[82] Diaz, "Syria said to have offered chemical weapons to Iran"; and Shaw, "Syria Reported to Be Making Chemical Arms".

[83] Studeman Statement, 1 March 1988, p. 48; "China and Israel"; and Oberdorfer, "Chemical Arms Curbs Are Sought".

[84] Studeman Statement, 1 March 1988, p. 48.

[85] Israeli, rather than US, sources, have stated this. See, for example, "Analyst Warns of Chemical Weapons," *Near East Report*, 25 August 1986.

[86] See, Elisa D. Harris, "Sverdlovsk and Yellow Rain: Two Cases of Soviet Non-compliance?" *International Security*, Vol. 11, No. 4, 1987, pp 41–95.

[87] These ideas are drawn from Robinson, "Some Developments Over the Past Year in the Field of Chemical-Warfare Armament," p. 3.

[88] Don Oberdorfer, "US Curbs Chemicals to Iran, Iraq," *Washington Post*, 31 March 1984.

[89] Bernard Gwertzman, "US Includes Syria in Chemicals Ban," *New York Times*, 6 June 1986.

[90] "US tightens exports of warfare chemicals," *Chemical and Engineering News*, 10 August 1987.

[91] *SIPRI Yearbook 1985*, pp. 174–75.

[92] John Tagliabue, "Bonn Limits Export of Chemical-Arms Materials," *New York Times*, 8 August 1984.

[93] *SIPRI Yearbook 1985*, pp. 174–75. The countries involved included Belgium, Denmark, France, the Federal Republic of Germany, Greece, Italy, Luxembourg, the Netherlands, the Republic of Ireland, and the United Kingdom.

[94] *International Affairs* (Moscow), April 1986, pp. 151–52.

[95] *ADN*, 24 June 1987 as reported in FBIS–EE, 25 June 1987, cited in *Arms Control Reporter, 1987*, p. 704.B.231.

[96] Ember, "Worldwide Spread of Chemical Arms Receiving Increased Attention," p. 11.

[97] Oberdorfer, "Chemical Arms Curbs Are Sought".

[98] Oberdorfer, "Chemical Arms Curbs Are Sought," and Ember, "Worldwide Spread of Chemical Arms Receiving Increased Attention," p. 11.

[99] Robinson, "Some Developments Over the Past Year in the Field of Chemical-Warfare Armament," p. 7.

[100] Don Oberdorfer, "US Soviets May Meet Soon On Curbing Chemical Arms," *Washington Post*, 4 January 1986.

[101] "Text of the Joint US-Soviet Statment 'Greater Understanding Achieved.'" *New York Times*, 22 November 1985.

[102] William Beecher, "US seeking action to halt chemical arms spread," *Boston Globe*, 4 February 1986.

[103] Leslie H. Gelb, "US-Soviet Pact on Chemical Arms Said to Be Near," *New York Times*, 12 November 1985.

[104] Soviet Embassy, "Statement by Mikhail Gorbachev," p. 7.

[105] "US rejects chemical weapons plan," *Boston Globe*, 11 February 1986. See also, Thomas W. Netter, "US Rebuffs Soviet on Chemical Arms," *New York Times*, 12 February 1986.

[106] A US Government Fact Sheet released at the end of 1987 simply stated that the two sides "have reviewed export controls and political steps to limit the spread and use of chemical weapons." US Information Service, "US Arms Control Initiatives (Text: US Government Fact Sheet)," London, 8 December 1987, p. 6.

[107] Iraq reportedly has used both these tactics. See, "A plaque of 'hellish poison'," *US News and World Report*, 26 October 1987; and Steven Dickman, "Nerve gas cloud hangs over West German firms," *Nature*, 14 April 1988, p. 573.

[108] US Senate, *Joint Hearing on Chemical Warfare*, p. 17.

[109] Thomas W. Netter, "US Rebuffs Soviet of Chemical Arms," *New York Times*, 12 February 1986.

[110] Ember, "Worldwide Spread of Chemical Arms Receiving Increased Attention," p. 12.

[111] United Kingdom Mission to the United Nations, "Speech by the Rt Hon Sir Geoffrey Howe QC MP at the Third Special Session of the United Nations General Assembly Devoted to Disarmament," 7 June 1988, p. 2.

[112] Some past reports on subnational proliferation problems may be found in *SIPRI Yearbook 1983*, p. 407; and US House of Representatives, *Report on Binary Weapons*, pp. 69–71.

[113] Gary Yerkey, "Experts study threat of chemical weapons in terrorists' hands," *Christian Science Monitor*, 29 August 1986.

[114] Seymour Hersh, "US Aides Say Iraqis Made Use of a Nerve Gas," *New York Times*, 30 March 1984; and Oberdorfer, "US Curbs Chemicals to Iran, Iraq."

[115] Marie Colvin and John Witherow, "Syrian nerve gas warheads alarm Israel," *Sunday Times*, 10 January 1988.

[116] "Iraq, Saying it Hit Tankers, Threatens Chemical Strikes," *International Herald Tribune*, 30 March 1988.

[117] Aaron Karp, "The frantic Third World quest for ballistic missiles," *Bulletin of Atomic Scientists*, June 1988, pp. 14–20.

[118] These concerns are clearly articulted in Francois Heisbourg, "Missiles: Steps That Might Check Proliferation," *International Herald Tribune*, 30 March 1988.

EXHIBIT NO. 12

ST. JOHN'S EPISCOPAL HOSPITAL SOUTH SHORE
327 Beach 19 Street, Far Rockaway, New York 11691
(718) 917-3000

February 8, 1989

David B. Buckley
Staff Investigator
Permanent Subcommittee on
  Investigations
United States Senate
100 Russell Building
Washington, D.C. 20510

Dear Mr. Buckley:

The following are descriptions of the cases of two adult Kurdish patients who were exposed to poison gases as a result of the bombing of their village of Halabje in 1988 during the Iran-Iraq war. Both patients were transferred from Iran to St. John's Episcopal Hospital-South Shore for further evaluation and treatment.

Sincerely,

Victor Burnett, M.D.
Chairman
Department of Medicine

VB:md
Encl.

A hospital of the Episcopal Health Services family

This 25 year old Kurdish man was admitted to St. John's Episcopal Hospital-South Shore on March 29, 1988 following exposure to poison gas on March 15, 1988. On March 15, 1988, the patient's village of Halabje in northern Iraq near the Iranian border was bombed from the air with bombs containing poison gas. He was taken to Iran where he was treated in a hospital for extensive skin burns, pulmonary symptoms (shortness of breath, worse in the last 5 days) and eye symptoms (purulent discharge). He was treated with ampicillin and silver sulfadiazine. He was flown by the Iranian government to the United States for additional evaluation and treatment at St. John's Episcopal Hospital-South Shore.

Review of symptoms was non-contributory.

Past Medical History - No smoking and no alcohol
(The initial history was impaired by a language barrier. An interpreter aided subsequent management.)

Physical Examination

BP 114/80 P 104 T Afebrile R 20

Skin - Superficial partial thickness burns in the perioral area, the right deltoid area and the scrotum. There were crusted erosions, confluent and discrete under and around the nares and lips. There were confluent crusted lesions on the scrotum. In the right deltoid area, there was a healing erosion with surrounding hyperpigmentation

Eyes - Kept eyes closed to avoid light. Purulent secretions on eyelids - red conjunctiva

Nose - Exudate from nostrils

Throat - Erythematous

Lungs - Scattered rhonchi. Prolonged expiration greater on the left

The remainder of the physical exam was normal

Laboratory Data

CBC: Day # 1 - WBC 12,100, Segs 83%, Bands 3%, Lymphs 14%, RBC 4,200,000 Hgb 13.8 g/dl, Hct 40.3%, MCV 95.9 µm^3, MCH 32.8 pg, MCHC 34.2 g/dl, platelets 692,000

Day #2 - WBC 10,600, RBC 3.91, Hgb 12.5, Hct 38.3, MCV 97.7 MCH 32.0, MCHC 32.7, Platelets 707,000

Day #3 - WBC 12,100, Segs 80, Lymphs, 18, Mono 1, Eosin 1, RBC 4,200,000, Hgb 13.8, Hct 40.8, MCV 97.2, MCH 32.9, MCHC 33.8, platelets 764,000

Day #5 - WBC 10,100, RBC 4,150,000, Hgb 13.5, Hct 39.8, MCV 95.8, MCH 32.7, MCHC 34.1, platelets 745,000

Day #6 - WBC 8,700, Segs 85, Lymphs 13, Mono 2, RBC 4,180,000, Hgb 13.5, HCT 40.1, MCV 95.9, MCH 32.3, MCAC 33.6, platelets 752,000

Day #11- WBC 17,400, Segs 73, Lymphs, 21, Mono 6, RBC 4,120,000, Hgb 13.6, HCT 39.8, MCV 96.5, MCH 33.1, MCHC 34.3, platelets 462,000

Day #12- WBC 11,900, Segs 83, Lymphs 12, Mono 4, Atypical Lymph 1, RBC 4,010,000, Hgb 13.2, Hct 38.6, MCV 96.1, MCH 33.0, MCHC 34.3, platelets 399,000

Day #13- WBC 11,300, Segs 79, Band 1, Lymphs 15, Mono 5, RBC 3,940,000, Hgb 13.0, Hct 37.9, MCV 96.0, MCH 32.9, MCHC 34.3, platelets 352,000

Urineanalysis - Day # 1 - Normal

Chemistry

Day # 1 - Glucose 100 mg/dl, BUN 9mg/dl, creatinine 0.8 mg/dl, sodium 135mmol/L, potassium 5.1 mmol/L, chloride 96 mmol/L, carbon dioxide 25 mmol/L, calcium 9.6 mg/dl, magnesium 2.0 meq/L (normal up to 1.8), phosphorus 3.9 mg/dl, cholesterol 123 mg/dl, uric acid 2.2 mg/dl, total protein 7.7 g/dl, albumin 3.5 g/dl, AST 22 U/L, ALT 47 U/L, LDH 527 U/L, CPK 46 U/L, alkaline phosphatase 137 U/L (normal to 122),
- total bilirubin 0.8 mg/dl

Day # 2 - Glucose 101, BUN 10, creatinine 0.7, sodium 138, potassium 4.7, chloride 97, carbon dioxide 26

Day # 3 - Glucose 80, BUN 10, creatinine 0.9, sodium 139, potassium 4.9, chloride 100, carbon dioxide 23

Day # 6 - Glucose 87, BUN 10, creatinine 0.7, sodium 139, potassium 4.8, chloride 101, carbon dioxide 25, calcium 9.4, magnesium 2.0, phosphorus 3.0, cholesterol 119, uric acid 2.1, total protein 6.5, albumin 3.5, AST 10, ALT 22, LDH 503, CPK 37, alkaline phosphatase 102, total bilirubin 0.4.

Day # 8 - Glucose 82, BUN 7, creatinine 0.8, sodium 149, potassium 4.6, chloride 102, carbon dioxide 28

Chemistry (continued)

Day # 9 - Glucose 88, BUN 5, creatinine 0.7, sodium 138, potassium 4.4, chloride 100, carbon dioxide 30

Day # 11 - Glucose 69, BUN 10, creatinine 0.9, sodium 140, potassium 4.8, chloride 100, carbon dioxide 22, calcium 9.5, phosphorus 3.9, cholesterol 118, uric acid 3.4, total protein 7.4, albuminum 3.8, AST 27, ALT 23, LDH 743 (normal up to 537), CPK 30, alkaline phosphatase 106, total bilirubin 0.7

Day # 13 - Glucose 78, BUN 8, creatinine 0.9, sodium 140, potassium 4.3, chloride 97, carbon dioxide 24, calcium 9.1, phosphorus 4.2, cholesterol 124, uric acid 3.6, total protein 6.9, albumin 3.5, AST 8, ALT 13, LDH 460, CPK 20, alkaline phosphatase 101, total bilirubin

Theophylline

Day # 3 - 0.3 ug/ml (therapeutic 10-20); Day #5 - 0.1, Day #6 - 0.1,
Day # 8 - 6.7, Day #9 - 4.3, Day #10 - 5.9, Day #11 - 8.6, Day # 12 - 11.2

Arterial Blood Gas

Day # 1 - pH 7.49, pCO_2 37 mmHg, pO_2 56 mmHg, O_2 saturation 91%, CO_2 29 mM/L, HCO_3 28 mEq/L, base excess +5 (Room Air)

Day # 1 - pH 7.44, pCO_2 38, pO_2 79.5, O_2 saturation 96, CO_2 26, HCO_3 15, base excess 3.4 (40% ventimask)

Day # 5 - pH 7.46, pCO_2 39, pO_2 69, O_2 saturation 95, CO_2 29, HCO_3 28, base excess +5 (Room Air)

Day # 7 - pH 7.47, pCO_2 41m, pO_2 64, O_2 saturation 94, CO_2 31, HCO_3 30, base excess +7 (Room Air)

Day # 10 - pH 7.46, pCO_2 36, pO_2 67, O_2 saturation 94, CO_2 26, HCO_3 25, base excess +2.7 (Room Air)

PT/PTT - Day # 1 - PT 14.5 pt/12.9 control (normal 12.1 - 14.5 sec)
PTT 35.4 pt/29.9 control (normal 28.3 - 36.9 sec)

Cultures

Urine (Day #1) - Negative x1
Blood (Day #1) - Negative x2
Sputum (Day #2) - Normal flora

Chest X-Rays

Day #1, 3, 8, and 11 - All chest x-rays show hyperlucency of the lower half of the right lung and increased interstitial markings with no changes noted

Drug Screen - Day #6 - Positive for acetaminophen and nicotine

Hospital Course

The patient's problems were in three areas, pulmonary, dermatological and ophthalmological. The most serious of the problems was the pulmonary problem. On admission, he complained of dyspnea. He was seen by a pulmonary consultant. There was evidence of bronchospasm. The findings noted above on chest x-ray could have been secondary to inhalation of poison gas but there was no x-ray prior to the inhalation of poison gas for comparison. The initial PO_2 on room air was low at 56. The WBC count was elevated with an increase in segmented polys. The conclusion was that the patient had suffered a chemical burn of the lung and that there might be superimposed bacterial infection. Therefore, the patient was started on cephapirin IV, aminophylline IV and alupent (metaproternol) by inhalation and oxygen. The oxygen was stopped after a few days. On day #7, the IV aminophylline was stopped and was replaced by oral theophylline. The dose of theophylline was adjusted to get the theophylline blood level to a therapeutic level. The IV cephapirin was stopped on day #9 and was replaced by oral keflex. The metaproternol by inhalation was continued. At the time of discharge on April 14, 1988 (day #16), the patient had a non-productive cough and dyspnea on exertion. He had diffuse rales and wheezes. The pO_2 on room air never got higher than 69 (on day #5).

A dermatologist and plastic surgeon saw the patient in consultation because of the skin burns. The dermatologist concluded that the skin findings were chemical burns with superinfection probably bacterial in origin. The possibility of a superimposed herpes simplex infection of the lesions near the nares and lip could not be ruled out. The skin lesions were treated with Burrows solution and acyclovir ointment. Acycloir by mouth was given because of the possibility of herpes simplex infection of the area near the lips and nares. The skin lesions healed nicely.

The patient was seen and followed in consultation by an ophthalmologist. The patient had a blepharitis, a conjunctivitis, a keratitis and an iritis. Initially, he had marked photophobia and purulent secretions on the eyelids and conjunctiva. He was treated with 1% atropine eye drops, decadron eye ointment and blephamide eye drops. On this management, the eye lesions completely cleared.

An ENT consultant found oro-pharyngeal burns. The patient frequently complained of a sore throat. He was treated with saline gargles with improvement.

The patient was discharged on April 13, 1988 and was to be flown back to Iran. The care of the patient was aided by consultation on March 30, 1988 with Professor A. Heyndrickx, Head of the Department of Toxicology, State University of Ghent, Belgium and Project Director of the United Nations International Development Organization. In addition, on April 4, 1988, the patient was visited in consultation by physicians from the U.S. Army who are experts in Chemical Casualty Care. They include David Compton, M.D., Michael Dunn, M.D., Frederick Sidell, M.D. and John Urbanetti, M.D.

Dr. Heyndrickx performed toxicological tests on samples of hair, urine and blood dated April 2, 1988 and urine and plasma dated April 4, 1988. Quoting from his conclusions dated April 6, 1988, "The results of blood and urine confirm that at least three war gases in combination have been used: mustard gas, an organic phosphate which inhibits the human acetylcholinesterane and cyanide or

Hospital Course (Continued)

derivatives." Dr. Heyndrickx found mustard gas in the urine of the patient who is the subject of this report. He did not find abnormal amounts of cyanide in the urine. He did find a low level of acetylcholinesterase in the plasma. Please see the attached report from Dr. Heyndrickx.

This 30 year old Kurdish woman was admitted to St. John's Episcopal Hospital-South Shore on March 29, 1988 following exposure to poison gas on March 13, 1988. On March 15, 1988, the patient's village of Halabje in northern Iraq near the Iranian border was bombed from the air with bombs containing poison gas. She was taken to Iran where whe was treated in a hospital for skin burns and a pulmonary problem. She apparently developed pneumonia and was treated with antibiotics. Ten days after exposure to the poison gas, she delivered twin babies, both of whom died shortly after birth. She was subsequently flown by the Iranian government to the United States for additional evaluation and treatment at St. John's Episcopal Hospital-South Shore.

Review of systems was non-contributory.

Past medical history - No smoking and no alcohol
(The initial history was impaired by a language barrier. An interpreter aided subsequent management.)

Physical Examination

BP 100/70 P 125 T 101^5 (oral) R 28

In mild respiratory distress

Skin - Healing lesions under both breasts, lateral flexor surface of right leg near the knee, both groin areas, lower abdomen and sacral area. Toes had erosions with white eschar on some of the web spaces between the toes. Areas of hyperpigmentation around erosions.

Eyes - Kept eyelids closed to avoid the light. Exudate on eye lids and red conjunctiva

Nose - Small scars around nostrils and exudative secretions inside nostrils

Mouth - Scars at corner of lips

Throat - Erythematous

Lungs - Scattered diffuse rhonchi, wheezes and rales, greater on the right side.

The remainder of the physical exam was normal.

Laboratory Data

CBC: Day # 1 - WBC 25,200, Segs 76%, Lymphs 15%, Mono 6%, Eosin 1%, Metamyelocyte 2%, RBC 5,030,000, Hgb 12.1 g/dl, Hct 37.8%, MCV 75.0 mm^3, MCH 24.1 pg, MCHC 32.2 g/dl, platelets 417,000

Day # 2 - WBC 15,300, Segs 78, Band 6, Lymphs 13, Mono 2 Metamyelocyte 2, RBC 4,120,000, Hgb 10.0, Hct 31.4, MCV 76.1, MCH 24.4, MCHC 32.1, platelets 393,000

Day # 4 - WBC 16, 700, Segs 8.7, Band 2, Lymph 10, Mono, 1 RBC 4,350,000, Hgb 10.5, Hct 33.1, MCV 76.1, MCH 24.1, MCHC 31.6, platelets 528,000

Day # 5 - WBC 15,300, Segs 87, Band 2, Lymph 4, Mono 7, RBC 4,360,000, Hgb 10.6, Hct 33.7, MCV 77.2, MCH 24.3, MCHC 31.5, platelets 434,000

Day # 7 - WBC 16,200, Segs 90, Band 2, Lymphs 6, Mono 2, RBC 4,460,000, Hgb 10.7, HCT 34.6, MCV 77.5, MCH 23.9, MCHC 30.8, platelets 489,000

Day # 8 - WBC 10,700, Segs 86, Lymphs 14, RBC 4,020,000, Hgb 9.7, Hct 30.9, MCV 76.7, MCH 24.2, MCHC 31.5, platelets 482,000

Day # 9 - WBC 9,300, Segs 84, Band 1, Lymphs 14, Eosin 1, RBC 3,990,000, Hgb 9.5, Hct 30.4, MCV 76.2, MCH 23.8, MCHC 31.2, platelets 441,000, Retic 4.7

Day # 10 - WBC 10,900, Segs 61, Lymphs 34, Mono 5, RBC 4,230,000, Hgb 10.4, Hct 32.4, MCV 76.8, MCH 24.6, MCHC 32.1, platelets 448,000, Retic 2.1

Day #13 - WBC 7,300, RBC 4,040,000, Hgb 10.2, Hct 31.5, MCV 77.7, MCH 25.1, MCHC 32.3, platelets 476,000

Day # 19 - WBC 7,700, RBC 4,440,000, Hgb 11.3, Hct 36.5, MCV 82.1, MCH 25.5, MCHC 31.0, platelets 480,000, retic 4.8

Day # 20 - WBC 9,100, RBC 4,440,000, Hgb 11.5, Hct 36.9, MCV 83.0, MCH 25.9, MCHC 31.2, platelets 375,000

Day # 21 - WBC 5,600, Segs 86, Lymphs 14, RBC 4,440,000, Hgb 11.9, Hct 37.4, MCV 84.1, MCH 26.8, MCHC 31.9, platelets

Day # 25 - WBC 3,400, Segs 57, Band 3, lymphs 39, Mono 1, RBC 3,600,000, Hgb 9.7, Hct 30.3, MCV 84.1, MCH 27.1, MCHC 32.2, platelets 193,000

Day # 27 - WBC 3,400, Segs 64, Band 3, Lymphs 33, RBC 3,410,000, Hgb 9.3, Hct 28.7, MCV 84.1, MCH 27.4, MCHC 32.6, platelets 181,000

Urine Analysis

Day # 2 - SpG 1.014, Leukocyte esterase 1+, Nitrite Trace, pH 6, protein neg, occult blood 2+, WBC 50-65/HPF, Red Cells Mod/HPF, Epith cells Mod/HPF, Bacteria Many

Day # 3 - SpG 1.008, Leukocyte esterase Neg, Nitrite Neg, pH 8, protein neg, occult blood 1+, WBC 65-70, RBC 20-25, Epith cells some, Bacteria occasional

Urine Analysis (Continued)

Day # 11 - SpG 1.008, Leukocyte esterase Neg, Nitrite Neg, pH 7, protein neg, occult blood 3+, WBC 0-3, RBC full field, Epith cell occasional

Day # 12 - SpG 1.012, Leukocyte esterase Trace, Nitrite Neg, pH 7, protein trace, occult blood 3+, WBC 2-4, RBC 65-70, Epith cells Few, Bacteria few

Day # 16 - SpG 1.020, Leukocyte esterase Trace, pH 6, protein 2+, occult blood 3+, WBC 30-40, RBC 60-70, Epith cells Few, Bacteria Loaded

Day # 26 - SpG 1.014, Leukocyte esterase Neg, Nitrite Neg, pH 5, protein neg, WBC 4-8, RBC 2-3

Day # 27 - SpG 1.007, Leukocyte esterase Neg, Nitrite Positive, pH 6, protein 1+, WBC 0-1, RBC 0, Epith Occasional, Bacteria 4+

Chemistry

Day # 1 - Glucose 77mg/dl, BUN 13 mg/dl, creatinine 0.3 mg/dl, sodium 132 mmol/L, potassium 3.9 mmol/L, chloride 89 mmol/L, carbon dioxide 26 mmol/L, calcium 7.3 mg/dl, magnesium 1.5 meq/L, phosphorus 3.2 mg/dl, cholesterol 95 mg/dl, uric acid 3.7 mg/dl, total protein 5.8 g/dl, albumin 2.3 g/dl, AST 43 U/L (normal up to 35), ALT 25 U/L, LDH 1355 U/L (normal up to 537), CPK 49 U/L, alkaline phosphatase 195 U/L (normal up to 122), total bilirubin 0.3 mg/dl.

Day # 2 - Glucose 116, BUN 10, creatinine 0.2, sodium 138, potassium 3.6, chloride 98, carbon dioxide 32, calcium 7.5, magnesium 1.6, phosphorus 1.7, cholesterol 87, uric acid 3.6, total protein 5.2, albumin 2.0, AST 32, ALT 16, LDH 936, CPK 54, alkaline phosphatase 126, total bilirubin 0.3

Day # 3 - Glucose 82, BUN 7, creatinine 0.3, sodium 132, potassium 4.0, chloride 91, carbon dioxide 34, calcium 6.9, magnesium 1.6, phosphorus 2.5, cholesterol 83, uric acid 2.6, total protein 5.2, albumin 2.0, AST 19, ALT 19, LDH 627, CPK 18, alkaline phos. 142, total bilirubin 0.2

Day # 5 - Glucose 80, BUN 6, creatinine 0.3, sodium 132, potassium 4.9, chloride 91, carbon dioxide 32, calcium 8.2, magnesium 1.5, phosphorus 4.5, cholesterol 97, uric acid 1.7, total protein 6.3, albumin 2.3, AST 33, ALT 24, LDH 524, CPK 13, ALK Phos. 153, GGT 63, total bilirubin 0.3

Day # 7 - Glucose 135, BUN 11, creatinine 0.2, sodium 134, potassium 4.8, chloride 91, carbon dioxide 26

Day # 8 - Glucose 88, BUN 7, creatinine 0.2, sodium 133, potassium 4.9, chloride 92, carbon dioxide 29, calcium 8.5, phosphorus 2.9, cholesterol 110, uric acid 3.2, total protein 6.0, albumin 2.5, AST 100, ALT 72, LDH 705, CPK 6, alkaline phos. 154, total bilirubin 0.4

Chemistry (Continued)

Day # 9 - Glucose 138, BUN 9, creatinine 0.3, sodium 135, potassium 4.3, chloride 91, carbon dioxide 32, calcium 8.3, magnesium 1.5, phosphorus 5.0, cholesterol 107, uric acid 3.6, total protein 6.7, albumin 2.4, AST 50, ALT 53, LDH 489, CPK 4, alkaline phos. 116, total bilirubin 0.3

Day # 10 - Glucose 173, BUN 12, creatinine 0.4, sodium 134, potassium 4.0 chloride 91, carbon dioxide 29, calcium 8.5, phosphorus 3.5, uric acid 3.1, total protein 7.5, albumin 2.8, AST 37, ALT 56, LDH 478, CPK 4, alk. phos. 126, total bilirubin 0.3

Day # 13 - Glucose 79, BUN 12, sodium 137, potassium 4.1, chloride 89, carbon dioxide 33, calcium 8.7, phosphorus 4.8, cholesterol 159, uric acid 4.4, total protein 6.8, albumin 2.7, AST 16, ALT 25, LDH 328, CPK 16, alk. phos. 126, total bilirubin 0.6

Day # 19 - Glucose 81, BUN 16, creatinine 0.4, sodium 135, potassium 4.2, chloride 90, carbon dioxide 32, calcium 9.0, phosphorus 4.9, cholesterol 210, uric acid 3.9, total protein 7.5, albumin 3.5, AST 17,, ALT 20, LDH 379, CPK 23, alk. phos. 115, total bilirubin 0.6

Day # 21 - Glucose 135, BUN 17, creatinine 0.3, sodium 132, potassium 4.4, chloride 88, carbon dioxide 33, calcium 8.7, magnesium 1.5, phosphorus 4.0, cholesterol 179, uric acid 3.1, total protein 7.3, albumin 3.7, AST 4, ALT 16, LDH 476, CPK 14, alk. phos. 95, total bilirubin 0.4

Day # 23 - Glucose 99, BUN 19, creatinine 0.2, sodium 127, potassium 5.1, chloride 77, carbon dioxide 38, magnesium 1.3

Day # 24 - Glucose 119, BUN 15, creatinine 0.2, sodium 128, potassium 4.1, chloride 79, carbon dioxide 38

Day # 27 - Glucose 107, BUN 15, sodium 127, potassium 3.7, chloride 76, carbon dioxide 40

Theophilline

Day # 3 - 10.6 mg/ml (therapeutic 10-20), Day # 7 - 2.4, Day # 8 - 4.2, Day # 8 - 2.9, Day # 9 - 7.8, Day # 10 - 9.9, Day # 11 - 13.2, Day # 13 - 3.8, Day # 14 - 10.0, Day # 15 - 16.7, Day # 17 - 15.7, Day # 20 - 6.5, Day # 21 - 12.3, Day # 23 - 13.8, Day # 24 - 25.1, Day # 25 - 15.0, Day # 27 - 12.2

Arterial Blood Gas

Day # 1 - pH 7.46, pCO_2 50 mmHg, pO_2 39 mmHg, O_2 saturation 76%, CO_2 37 mM/L, HCO_3 36 mEq/L, base excess 11.6 (room air)

Day # 1 - pH 7.41, pCO_2 58, pO_2 74, O_2 saturation 95, CO_2 38, HCO_3 37, base excess 10 (50% O_2 by mask worn intermittently)

Day # 2 - pH 7.41, pCO_2 57, pO_2 52, O_2 saturation 86, CO_2 37, HCO_3 36, base excess 10.3 (O_2 ? concentration by mask - off face for 5 minutes)

Arterial Blood Gas (Continued)

Day # 2 - pH 7.40, pCO_2 61, pO_2 65, O_2 saturation 92, CO_2 37, HCO_3 36, base excess 10.5 (? FIO_2)

Day # 2 - pH 7.45, pCO_2 51, pO_2 43, O_2 saturation 80, CO_2 37, HCO_3 36, base excess 11.1 (room air)

Day # 3 - pH 7.45, pCO_2 49, pO_2 61, O_2 saturation 92, CO_2 34 (40% O_2 by mask)

Day # 3 - pH 7.50, pCO_2 44, pO_2 51, O_2 saturation 89, CO_2 34, HCO_3 33, base excess 10.2 (room air)

Day # 3 - pH 7.46, pCO_2 55, pO_2 46, O_2 saturation 84, CO_2 39, HCO_3 38, base excess 13.1 (room air)

Day # 4 - pH 7.39, pCO_2 61, pO_2 74, O_2 saturation 94, CO_2 38, HCO_3 37, base excess 10 (face tent 50% O_2)

Day # 5 - pH 7.37, pCO_2 61, pO_2 80, O_2 saturation 95, CO_2 37, HCO_3 36, base excess 8 (face tent 50% O_2)

Day # 5 - pH 7.44, pCO_2 55, pO_2 55, O_2 saturation 89, CO_2 38, HCO_3 37, base excess 11 (40% O_2 face tent)

Day # 6 - pH 7.41, p CO_2 59, pO_2 75, O_2 saturation 95, CO_2 38, HCO_3 37, base excess 10 (50% O_2 face tent)

Day # 7 - pH 7.44, pCO_2 50, pO_2 68, O_2 saturation 94, CO_2 35, HCO_3 34, base excess 4.5 (50% O_2 face tent)

Day # 8 - pH 7.41, pCO_2 63, pO_2 80, O_2 saturation 96, CO_2 42, HCO_3 41, base excess 14 (50% O_2 face tent)

Day # 8 - pH 7.46, pCO_2 49, pO_2 55, O_2 saturation 87, CO_2 36, HCO_3 35, base excess 10.2 (35% O_2 face tent)

Day # 9 - pH 7.45, pCO_2 56, pO_2 53, O_2 saturation 88, CO_2 40, HCO_3 39, base excess 13 (50% O_2 face tent)

Day # 10 - pH 7.44, pCO_2 50.9, pO_2 76.6, O_2 saturation 96, CO_2 35, HCO_3 34, base excess 9.0 (40% O_2 aerosol face mask)

Day # 11 - pH 7.52, pCO_2 38, pO_2 48.8, O_2 saturation 88, CO_2 33, HCO_3 32, base excess 9.3 (room air)

Day # 12 - pH 7.48, pCO_2 42, pO_2 84, O_2 saturation 97, CO_2 32, HCO_3 31, base excess 7.9 (40% O_2 aerosol face mask removed for 5 minutes)

Day # 15 - pH 7.38, pCO_2 62, pO_2 88, O_2 saturation 96, CO_2 38, HCO_3 37, base excess 9.4 (? FIO_2)

Day # 18 - pH 7.39, pCO_2 54, pO_2 38, O_2 saturation 69, CO_2 34, HCO_3 33, base excess 7 (room air)

Day # 21 - pH 7.37, pCO_2 68, pO_2 40.7, O_2 saturation 72.4, CO_2 41, HCO_3 40, base excess 11.7 (room air)

Arterial Blood Gas (Continued)

Day # 21 - pH 7.33, pCO_2 68, pO_2 80, O_2 saturation 95, CO_2 38, HCO_3 37, base excess 8.2 (40% FIO_2)

Day # 23 - pH 7.41, pCO_2 80, pO_2 35, O_2 saturation 64, CO_2 51, HCO_3 50, base excess 21 (28% FIO_2)

Day # 23 - pH 7.42, pCO_2 71, pO_2 38, O_2 saturation 70, CO_2 47, HCO_3 46, base excess 17.4 (30% O_2 face tent)

Day # 24 - pH 7.38, pCO_2 84, pO_2 54, O_2 saturation 85, CO_2 51, HCO_3 50, base excess 20.1 (2 liters O_2 per minute by nasal cannula)

Day # 24 - pH 7.44, pCO_2 72, pO_2 45, O_2 saturation 80, CO_2 50, HCO_3 49, base excess 21 (2 liters O_2 per minute by nasal cannula)

Day # 24 - pH 7.39, pCO_2 80, pO_2 55, O_2 saturation 88, CO_2 51, HCO_3 50, base excess 20 (? FIO_2)

Day # 26 - pH 7.41, pCO_2 74, $p\,O_2$ 51, O_2 saturation 85, CO_2 48, HCO_3 47, base excess 18.7 (? FIO_2)

Cultures

Sputum (Day #3) - Hemophilus Influenza
Sputum (Days # 8 and 26) - Normal Flora
Sputum for TB (Day # 2) - Negative Smear and Culture X 2
Blood Culture (Day #1 and Day #23) - Negative X 4
Urine Culture (Day # 2) - 10,000 colonies/ml of multiple organisms
(Day # 3) - 600,000 colonies/ml of gram positive organisms
Vaginal Culture (Day #2) - Normal Flora
Cervical Culture (Day #2) - Negative for Gonorrhea

Stool

Negative for blood, ova and parasites

Miscellaneous Blood Tests

Serum Zinc 84 mcg/DL
Ferritin 177 mg/ml
Hemoglobin Electrophoresis - Normal
Hepatitis A Surface Antigen - Negative
Hepatitis A Virus AB, IGM - Negative
Hepatitis B Core Antibody - IGM - Negative
Serum Iron 40 Before Oral Iron and 176 5 Days after Starting Oral Iron (Normal 39 - 150)
Total Iron Binding Capacity - 228 and 342 (Normal 241-421)
Coombs Test Direct and Indirect - Negative
VDRL Negative
Haptoglobin 70 (Normal 25-280)

Miscellaneous Blood Tests (Continued)

PT 12.8 secs, control 12.0 (Normal 12.4-14.5)
PTT 32.8 secs, control 32.8 (Normal 28.3-36.9)
T3 Uptake 44% (Normal 24-35%)
T4 4.2 (Normal 4.5-12.0 mcg/dl)

Chest X-Rays

Day # 1 - bilateral basilar opacifications; right base consolidation, small right pleural effusion; suspected consolidation and/or effusion at left base

Day # 2 - increased congestion of interstitium of lung; rest is unchanged

Day # 3 - less interstitial congestion; rest is unchanged

Day # 4 - loss of volume in right lower lobe; less opacification at left base; rest is unchanged

Day # 6 - right base is clearer with some lung expansion; left base is clearer

Day # 7 - unchanged

Day # 8 - right base is improved - more expansion of the lung and less infiltrate and right pleural effusion is improving; left base shows persistent consolidation

Day # 9 - unchanged

Day # 10 - both lung bases are clearer; minimal pleural thickening of the minor fissure

Day # 16 - marked improvement with minimal residual consolidation on right and left; accentuated interstitial markings at both bases

Day # 22 - normal x-rays

Day # 25 - normal x-rays

Day # 28 - normal x-rays

ECG - Non Specific ST change

Hospital Course

The patient's primary problems were in three areas, pulmonary, dermatological and ophthalmological. The most serious of the problems was the pulmonary problem. On admission the patient was in respiratory distress. She was therefore transferred on day #1 shortly after admission from a general medical floor to the I.C.U. She was seen in consultation by a pulmonary consultant on day #1. The WBC was 25,200. The initial ABG on room air showed a pH of 7.46, pCO_2 50, pO_2 39. The chest x-ray is described above. The impression on admission was that the patient had suffered a chemical burn of the lung due to inhalation of a toxic gas. In addition, she had a pneumonia, probably secondary to a superimposed bacterial infection. She was treated with oxygen, antibiotics (gentamycin and cefotaxime), bronchodilators (metaproternol by inhalation and IV aminophylline). The administration of oxygen was difficult because the patient frequently removed the oxygen delivery appliance from her face. An additional problem was the CO_2 retention which had to be carefully followed while she was receiving O_2. She received O_2 throughout her hospital course. Whenever O_2 was stopped for any reason, the pO_2 dropped to low levels. On day #2 ranitidine IV was begun to prevent GI stress ulceration. On day #3, upon the recommendation of an infectious disease consultant, cefotaxime was stopped and mezlocillin was started in its place. Gentamycin was continued. She had a cough productive of thick yellow sputum. She gradually improved. She became afebrile. The WBC decreased to normal. The chest x-rays improved. Appetite improved and she became more cooperative. On day #9 she was improved to the point where she was transferred out of the I.C.U. to a general medical floor. IV aminophylline was stopped and oral theophylline was started. On day #14 Mezlocillin, gentamycin and IVs were stopped and keflex was started. On day #15, keflex was stopped and trimethoprim sulfamethoxazole, oral theophylline, ranitidine and metaproternol by inhalation. She was periodically dyspneic and ranitidine and metaproternol by inhalation. She was periodically dyspneic and had persistent evidence of bronchospasm. On hospital day #22, she became febrile. She had a productive cough and diffuse wheezes. On day #23, she had a pCO_2 of 80, pO_2 35 on 28% FIO_2. She was dyspneic and had bilateral wheezes. She was transferred to the Special Care Unit and placed on IV solucortef and IV aminophylline. Trimethopterim sulfamethoxazole and metaproternol were continued. The possibility of intubation was considered. She gradually improved over the next several days. She was discharged by her physician on April 25, 1988 (day #28). At this time, she was afebrile with a pulse of 76 and a respiratory rate of 22, and her last chest x-ray on day #28 appeared to be normal. SHE STILL HAD WHEEZES. THE LAST ABG DONE ON DAY #26 WAS VERY ABNORMAL - pH 7.41, pCO_2 74, pO_2 51 (? PROB)

During the hospital course, there was a drop in the hemoglobin and the hematocrit probably secondary to rehydration. The MCV was of uncertain origin, but alpha thalasemia could not be ruled out despite the normal hemoglobin electrophoresis. (The patient was seen in hematological consultation.) In the last week of hospitalization, there was a progressive fall in the WBC count with a normal differential possibly secondary to one of the medications.

A dermatologist and a plastic surgeon saw the patient in consultation because of the skin burns. The dermatologist concluded that the skin findings were chemical burns, mostly superficial partial thickness except for possible third degree burns of the toe webbing. Treatment included debridement of both feet by the plastic surgeon, cleaning of lesions with sterile saline, silvadene cream, betadine wet to dry dressing of the feet. The skin lesions healed nicely.

Hospital Course (Continued)

The patient was seen in consultation by an ophthalmologist. The patient had a blepharitis, a conjunctivitis, a keratitis and an iritis. Initially, she had a marked photophobia and purulent exudate on the eyelids. She was treated with blephamide eyedrops, 5% homatropine eyedrops. On this management, the eyes completely cleared.

Additional consultations were obtained from a gynecologist and a psychiatrist.

The patient was discharged on April 25, 1988 and was to be flown back to Iran.

The care of the patient was aided by consultation on March 30, 1988 with Professor A. Heyndrickx, Head of the Department of Toxicology, State University of Ghent, Belgium and Project Director of the United Nations International Development Organization. In addition, on April 4, 1988, the patient was visited in consultation by physicians from the U.S. Army who are experts in Chemical Casualty Care. They include David Compton, M.D., Michael Dunn, M.D., Frederick Sidell, M.D. and John Urbanetti, M.D.

Dr. Heyndrickx performed toxicological tests on samples of hair, urine and blood dated April 2, 1988 and urine and plasma dated April 4, 1988. Quoting from his conclusions dated April 6, 1988, "The results of blood and urine confirm that at least three war gases in combination have been used: mustard gas, an organic phosphate which inhibits the human acetylcholinesterase and cyanide or derivatives." Dr. Heyndrickx found mustard gas in the urine of the patient who is the subject of this report. He did not find abnormal amounts of cyanide in the urine. He did find a low level of acetylcholinesterase in the plasma of this patient.

LABORATORIA
voor
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CRIMINALISTIEK

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Report n° : 88/NY/PJ881 .

TO WHOM IT MAY CONCERN

CLINICAL TOXICOLOGICAL REPORTS AND CONCLUSION OF THE BIOLOGICAL SAMPLES OF MEN, SENT TO THE DEPARTMENT OF TOXICOLOGY AT THE STATE UNIVERSITY OF GHENT, FOR TOXICOLOGICAL INVESTIGATION

Prof. A. Heyndrickx, Head
Department of Toxicology, State University of Ghent,
Hospitaalstraat 13, 9000 Ghent, Belgium

Different biological samples (blood, urine and hair) of men (Kurdistan) were sent from the St. John's Episcopal Hospital in New York (United States of America).
We received hair, urine and blood dated April 2nd, 1988 and urine and plasma dated April 4th, 1988.

I. FIRST REPORT OF THE TOXICOLOGICAL ANALYSIS

First series of samples (blood, urine and hair) dated April 2nd, 1988, sent by St. John's Episcopal Hospital of New York (U.S.A.) of patients from Kurdistan.
The samples arrived in Ghent on April 3rd at 10.30 a.m.

A. CYANIDES OR ANALOGUES (URINE)

Reference value for blood : 0 – 10 µg %

AZIZI MOHAMMAD (M1) : 0,2 µg %
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 2,2 µg %
MOHAMMAD COBRA (n° 2) : 2,2 µg %
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 20,5 µg %
HASSAN NAZANIN (V1) : 4,1 µg %

(Determination of cyanides in blood was not possible because it was clotted).

B. YPERITE, MUSTARD GAS (URINE, HAIR)

Urine : colour test (qualitative test)
Hair : colour test + CAM

AZIZI MOHAMMAD (M1) : urine : positive
hair : negative or below detection limit
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : urine : positive
hair : negative or below detection limit
MOHAMMAD COBRA (n° 2) : urine : positive
hair : negative or below detection limit
MOHAMMAD ABDOLGHADER REZAN (n° 3) : urine : strongly positive
hair : negative or below detection limit
HASSAN NAZANIN (V1) : urine : strongly positive
hair : negative or below detection limit

C. ARSENIC (URINE)

Reference value in urine : < 40,0 µg/g creatinine

AZIZI MOHAMMAD (M1) : 6,7 µg/g creatinine
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 15,1 µg/g creatinine
MOHAMMAD COBRA (n° 2) : 4,9 µg/g creatinine
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 28,6 µg/g creatinine
HASSAN NAZANIN (V1) : 12,7 µg/g creatinine

D. ACETYLCHOLINESTERASE ACTIVITY (BLOOD)

Method : Nenner
Reference value : 5,11 - 8,75 µmol/ml.min

AZIZI MOHAMMAD (M1) : 8,9 µmol/ml.min
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 9,6 µmol/ml.min
MOHAMMAD COBRA (n° 2) : sample was broken
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 6,7 µmol/ml.min
HASSAN NAZANIN (V1) : 7,5 µmol/ml.min

II. SECOND REPORT OF THE TOXICOLOGICAL ANALYSIS

Second series of samples (plasma and urine) dated April 4th, 1988, sent by St. John's Episcopal Hospital of New York (U.S.A.) of patients from Kurdistan.
The samples arrived in Ghent on April 5th at 11.05 a.m.

A. CYANIDES OR ANALOGUES (URINE)

Reference value for blood : 0 - 10 µg %

AZIZI MOHAMMAD (M1) : 3,8 µg %
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 1,6 µg %
MOHAMMAD COBRA (n° 2) : 12,6 µg %
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 5,7 µg %
HASSAN NAZANIN (V1) : 2,0 µg %

B. YPERITE, MUSTARD GAS (URINE)

Colour test (qualitative test)

AZIZI MOHAMMAD (M1) : slightly positive
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : slightly positive
MOHAMMAD COBRA (n° 2) : slightly positive
MOHAMMAD ABDOLGHADER REZAN (n° 3) : positive
HASSAN NAZANIN (V1) : positive

C. ARSENIC (URINE)

Reference value in urine : < 40,0 µg/g creatinine

AZIZI MOHAMMAD (M1) : 14,7 µg/g creatinine
MOHAMMAD ABDOLGHADER JAVAN (n° 1) : 5,6 µg/g creatinine
MOHAMMAD COBRA (n° 2) : 10,9 µg/g creatinine
MOHAMMAD ABDOLGHADER REZAN (n° 3) : 13,0 µg/g creatinine
HASSAN NAZANIN (V1) : 30,0 µg/g creatinine

D. ACETYLCHOLINESTERASE ACTIVITY (PLASMA)

a. Method : Nenner
Reference value : 1,26 - 2,66 µmol/ml.min

b. Method : Morand-Laborit
Reference value : 50 % ± 10 %

AZIZI MOHAMMAD (M1) : a. 0,76 µmol/ml.min
b. 40,3 %

MOHAMMAD ABDOLGHADER JAVAN (n° 1) : a. 1,32 µmol/ml.min
b. 51,8 %

MOHAMMAD COBRA (n° 2) : a. 1,21 µmol/ml.min
b. 56,6 %

MOHAMMAD ABDOLGHADER REZAN (n° 3) : a. 1,4 µmol/ml.min
b. 49,7 %

HASSAN NAZANIN (V1) : a. 0,0 µmol/ml.min
b. 20,9 %

E. PSEUDOCHOLINESTERASE ACTIVITY (PLASMA)

Reference value : DN (Dibucaîne) > 70) homozygote normal
FN (Fluoride) 55 - 70)

AZIZI MOHAMMAD (M1) : DN : 88
FN : 65

MOHAMMAD ABDOLGHADER JAVAN (n° 1) : DN : 92
FN : 42

MOHAMMAD COBRA (n° 2) : DN : 87
FN : 66

MOHAMMAD ABDOLGHADER REZAN (n° 3) : DN : 91
FN : 68

HASSAN NAZANIN (V1) : DN : 87
FN : 59

CONCLUSION

The results of blood and urine confirm that at least three wargases, in combination have been used : mustard gas (Yperite), an organic phosphate which inhibits the human plasma acetylcholinesterase (Tabun, Soman, Sarin, VX or analogues) and cyanide or derivatives (cyanogen chloride, CN^- or analogues).
The amounts found are very high and fatal.
There is no scientific doubt that those patients are lethal intoxicated by those chemical war agents.

Ghent, April 6th, 1988

Professor A. HEYNDRICKX
Head
Department of Toxicology
State University of Ghent
Belgium

EXHIBIT NO. [illegible]

NO. [illegible]

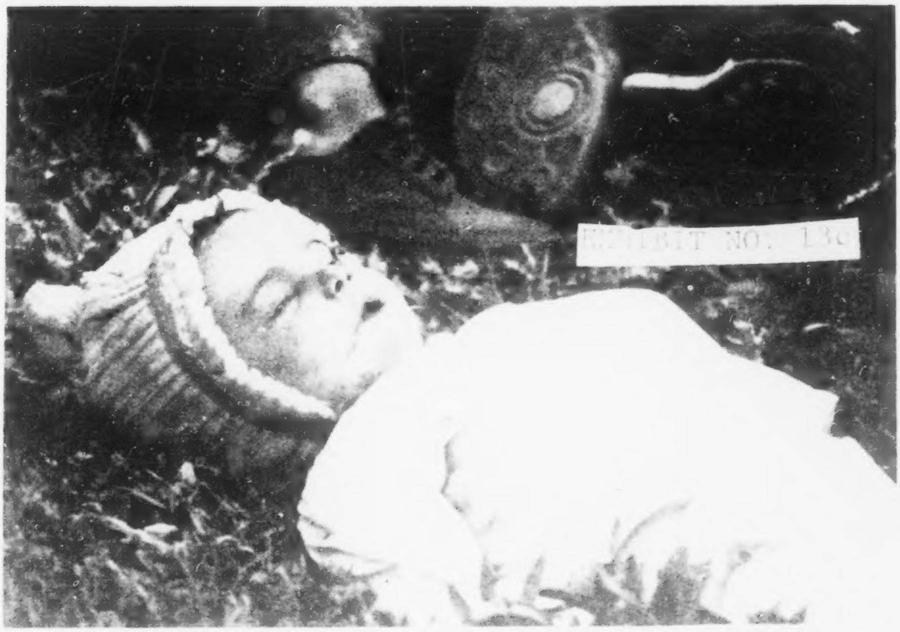
EXHIBIT NO. 13c

EXHIBIT NO. 13e

EXHIBIT NO. 14a

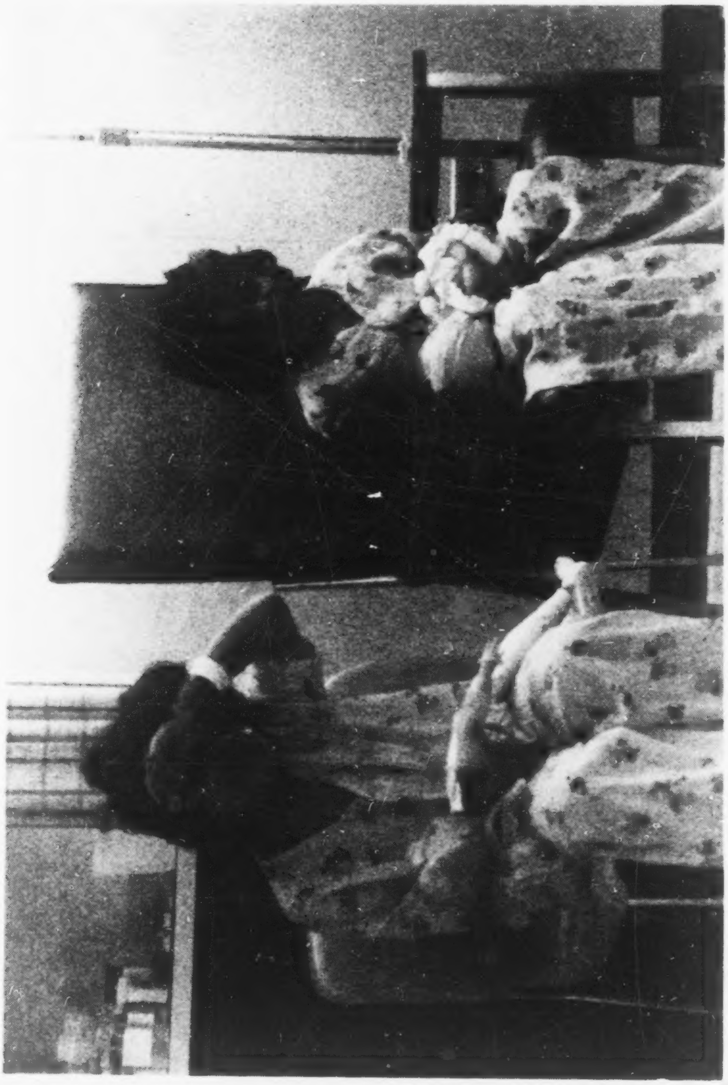

EXHIBIT NO. 14b

EXHIBIT NO. 14c

EXHIBIT NO. 15

WINDS OF DEATH:

IRAQ'S USE OF POISON GAS

AGAINST ITS KURDISH POPULATION

Report of a Medical Mission
to Turkish Kurdistan
by
Physicians for Human Rights

February 1989

PHYSICIANS FOR HUMAN RIGHTS

Physicians for Human Rights (PHR) is a national organization of health professionals whose goal is to bring the skills of the medical profession to the protection of human rights. PHR works to prevent the participation of doctors in torture, to defend imprisoned health professionals, to stop physical and psychological abuse of citizens by governments and to provide medical and humanitarian aid to victims of repression.

Since its founding in 1986, PHR has conducted missions to Chile, Czechoslovakia, Israel, the West Bank and Gaza Strip, Kenya, Malaysia, Panama, Paraguay, the Republic of Korea and Turkey. PHR adheres to a policy of strict impartiality and is equally concerned with the medical consequences of human rights abuses regardless of the ideology of the offending government or group.

Other reports available from Physicians for Human Rights:

- *The Casualties of Conflict: Medical Care and Human Rights in the West Bank and Gaza Strip*, March, 30 1988 - $6.00
- *Medical Mission to Czechoslovakia*, July 1988 - $4.00
- *Panama 1987: Health Consequences of Police and Military Actions*, April 6, 1988 - $6.00
- *Sowing Fear: The Uses of Torture and Psychological Abuse in Chile*, October, 1988 - $7.00
- *The Use of Tear Gas in the Republic of Korea: A Report by Health Professionals*, July 27, 1987 - $2.50

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Copies of this report are available from Physicians for Human Rights, 58 Day Street, Suite 202, Somerville, MA 02144, Tel. 617/623-1930.

Title page: Kurdish survivors of the August 1988 chemical attacks by Iraq collect water in Mardin refugee camp, Turkey, October 1988. (PHR)

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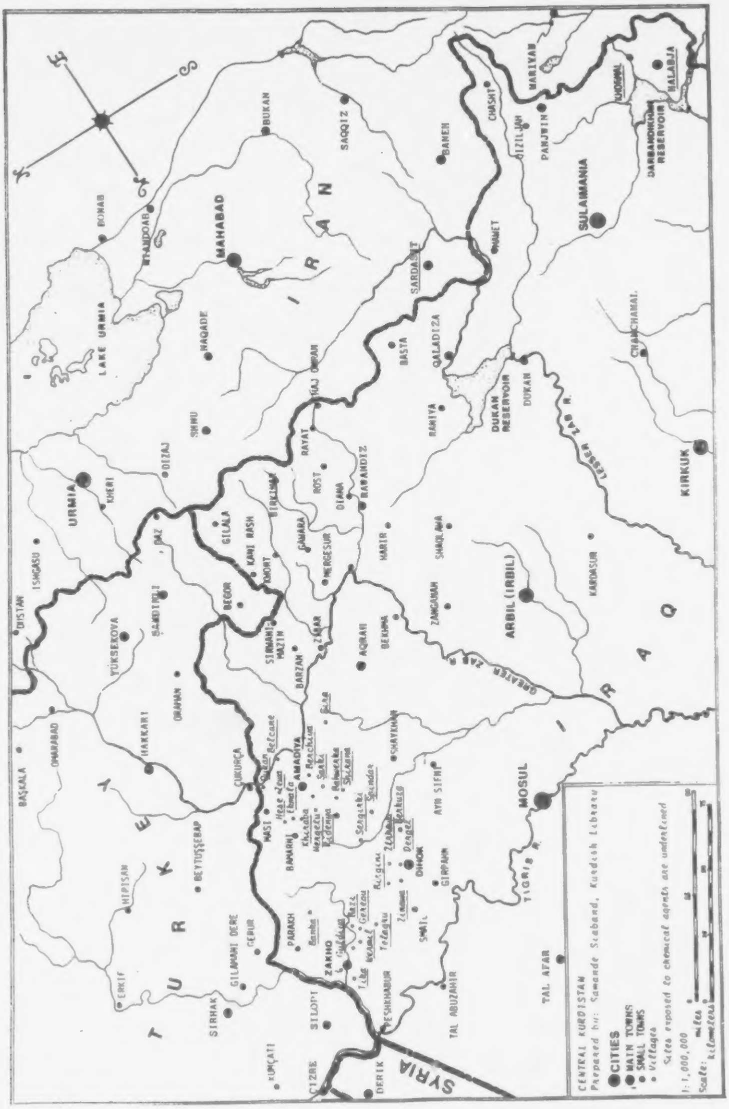
CENTRAL KURDISTAN
Prepared by: Samande Siaband, Kurdish Library
CITIES
MAIN TOWNS
SMALL TOWNS
Villages
Sites exposed to chemical agents are underlined
1:1,000,000
Scale: miles
kilometers
TURKEY
IRAN
IRAQ
SYRIA
LAKE URMIA
URMIA
MAHABAD
SAQQIZ
BUKAN
MIANDOAB
BONAB
NAQADE
SHNU
SARDASHT
BANEH
QALADIZA
RANIYA
DUKAN RESERVOIR
DUKAN
SULAIMANIA
HALABJA
DARBANDIKHAN RESERVOIR
CHAMCHAMAL
KIRKUK
LESSER ZAB R.
GREATER ZAB R.
ARBIL (IRBIL)
SHAQLAWA
HARIR
RAWANDIZ
DIANA
RAYAT
HAJ OMRAN
AQRAH
BARZAN
SIRNAK
HAKKARI
YUKSEKOVA
SEMDINLI
CUKURCA
BESKALE
DIYARBAKIR
AMADIYA
ZAKHO
DIHOK
MOSUL
TIGRIS R.
TAL AFAR
TAL ABUZAHIR
PESHKHABUR
SILOPI
CIZRE
DERIK
SIRHAK
KUMCATI
BEYTUSSEBAP
GEVER
ORAMAR
DISTAN
ISMGASU
KHERI
DIZAJ
GILALA
KANI RASH
BEGOR
SIRNANI MAZIN
ZEBAR
BEKHMA
ZANGANAH
KARDASUR
AYN SIFNI
GIRPANN
SMAIL
PARAKH
BAHARKI
MASI
CHAYKHAN
Bamba
Hese
Ebnala
Belcane
Dukan
Khuraba
Wergeru
Kidenya
Sengeki
Speindar
Zewah
Berkuse
Dergel
Tika
Gezeou
Nazi
Ziwana
Telagiu
Rezgini
Shireana
Balqeraka
Seski
Benchusa
Sira
NAMET
CHASHT
PANJWIN
MARIVAN
QIZILJAH
KHORMAL

AUTHORS' FOREWORD

As the final decade of the 20th Century approaches, the world faces critical choices in the effort to stem the proliferations of chemical weapons. Public revulsion at the use of chemical weapons in World War I led to the Geneva Protocol of 1925, which bans use of poison gases in war. The public reaction to poison gas warfare was due in large part to the indiscriminate nature of chemical warfare, its long-lasting medical effects, and the grotesque accounts of those directly exposed in the trenches. With a few exceptions, poison gas warfare on a large scale has been avoided since the end of World War I. Indeed, many countries have destroyed their stocks. Until recently, chemical weapons appeared to be a class of weapons whose use had been successfully contained by international agreements.

The Iran-Iraq war, however, reintroduced chemical warfare on a large scale, threatening to reopen this Pandora's box. Chemical weapons were used on many occasions in that conflict from 1983 through 1988. Iran and Iraq agreed to a cease-fire on July 18, 1988, to take effect a month later. There were some reports of chemical warfare in the Kurdish areas of Iraq in the period of August 3-6, 1988.

On August 25, 1988, several days after the cease-fire was implemented, Iraqi armed forces began a major military offensive against the Kurds in northern Iraq. Thus began a massive migration of more than 50,000 Kurds across the border into southeastern Turkey. The migration slowed on September 5, when Iraqi armed forces sealed the border.

Early press reports indicated that the Kurds had fled in the face of large-scale poison gas attacks. The Iraqi government denied using chemical weapons, just as they initially had denied using them in the conflict with Iran. Official statements by the Turkish government were equivocal, neither confirming nor denying that chemical weapons had been used. On September 12, the United States and twelve other countries asked the United Nations Secretary General to investigate the allegations. The Secretary General sought to send a team of experts to the region, but Iraq and Turkey denied the UN request.

Physicians for Human Rights (PHR) elected to send a mission to the region in light of uncertainty about whether poison gas had been used, the clear need for independent medical assessment, and the international significance of chemical warfare allegations. PHR did this out of its stated commitment to report the medical effects of human rights abuse, in this case focused on a government's alleged use of poison gas against its own people.

If Iraq did indeed use poison gas on Kurds living within its borders and under rule of its government, then the events of late August 1988 raise questions not only about whether the Geneva Protocol applies, but also whether a new and particularly odious form of human rights abuse -- poison gas attack by a government against its own citizens -- has been perpetrated for the first time.

A team of three doctors representing PHR went to Turkey from October 7-16, 1988. We designed a questionnaire specifically for this investigation. Twenty-seven residents of refugee camps, who reported being eyewitnesses to poison gas attacks while in northern Iraq, completed the 120-question forms. We also conducted physical examinations, videotaped in-depth interviews with over 20 camp residents, and spoke informally with hundreds of camp residents, government officials, journalists, diplomats, and other observers. The questionnaires took one-half to one hour to complete, and video interviews ranged from ten to thirty minutes in duration.

PHR initiated the investigation independently of any government or nongovernment organization, following consultation with specialists in chemical warfare, human rights, and Middle East studies. PHR requested permission from the government of Iraq to visit the sites of alleged attacks, and asked the governments of Iran and Turkey for permission to interview Iraqi refugees who fled the areas allegedly attacked. After waiting one month and receiving no response from the governments of Iran and Iraq, PHR elected to send the team to Turkey without further delay. Turkish Embassy officials in Washington, DC, assured us in advance that Iraqi refugees in newly formed camps would be accessible.

We assembled in Boston and flew directly to Ankara. From Ankara, we proceeded to southeastern Turkey, using the city of Diyarbakir as our principal base for five days. A two-day side trip to Hakkari Province and daily trips to Mardin Province and other areas began from Diyarbakir.

Despite considerable difficulties, we believe that the mission was able to gather convincing evidence that lethal poison gas was used against the Kurds on August 25, 1988. Obtaining such evidence was the principal goal of the mission. We were not able, however, to visit all the refugee camps, although we attempted to do so. Neither were we able to meet with health professionals involved in treating the Kurds in the camps.

We succeeded in entering two refugee camps. One camp near the city of Mardin housed just over 5,100 residents, and another near Diyarbakir over 13,100. In both cases, there was a delay of several hours, while we obtained permission to enter, and we had to leave before 5:00 p.m. camp curfews. We therefore spent only four to five hours in each camp. We sought to enter three other camps near the towns of Silopi and Yuksekova, containing a total of 30,000 inhabitants, but we were denied access to these by regional officials of the Turkish government. We also briefly visited one hospital in Hakkari Province, but were unable to tour it or speak with physicians working there.

We wish to thank the J. Roderick MacArthur Foundation, which has generously supported PHR's work in the Middle East through a grant, as well as the PHR members and contributors who helped make our trip possible. Many experts familiar with chemical weapons and Middle East politics kindly assisted the authors in preparing this report. It was ~~reviewed~~ by the PHR editorial review committee and a group of outside experts (see Appendix A). We thank the reviewers and others who enhanced the effectiveness of the mission. We thank Gwynne Roberts for the title. We also wish to thank Vera Saeedpour of the Kurdish Center and Samande Siaband of the Kurdish Library. Because of the need to safeguard some individuals, many who helped us cannot be thanked. We take this opportunity to offer a general expression of gratitude for their assistance.

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Georgetown University and
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The Johns Hopkins University

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Channing Laboratory
Harvard Medical School

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Director of Emergency Services
Northwest Medical Center
Detroit, MI
Observer and translator

PRINCIPAL FINDINGS

1. Iraqi aircraft attacked Kurdish villages in northern Iraq with bombs containing lethal poison gas on August 25, 1988.

This conclusion is based on responses to a systematically administered questionnaire, videotaped eyewitness accounts, and findings on physical examination of those residing in refugee camps in southeastern Turkey at the time of the mission.

2. Poison gas bombs killed humans and animals nearby, and caused severe suffering among survivors.

Refugees consistently reported that attacks were carried out by low-flying jets early in the morning of August 25, 1988. Bombing runs were followed by the appearance of yellowish clouds at the site of bomb bursts. Birds and domestic fowl near bomb bursts were killed within two to five minutes, followed closely by sheep, goats, cows, and mules. Larger mammals and people close to the point of detonation began to die soon afterwards. Their skin darkened and yellow, sometimes bloody, discharge drained from their noses and mouths. No survivor reported being closer than 50 meters to a bomb blast.

Survivors reported a cluster of symptoms indicating severe inflammation of the eyes, respiratory, gastrointestinal, and urinary tracts, and blistering skin burns.

3. Survivors told consistent stories about the August 25 attacks, even when residing in separate camps with no opportunity to communicate.

Statistical analysis of responses to the questionnaire demonstrated that refugees originating from the same village gave mutually consistent answers regarding the time of attack, weather conditions, number of attacking jets, and number of casualties in their village.

Those stating they were close to the site of bomb bursts reported a more severe pattern of characteristic symptoms, suggesting a dose-dependent response to the offending agents.

4. Survivors showed medical findings consistent with exposure to poison gas.

We examined a middle-aged man who was a casualty of poison gas attacks. He had several extensive lesions on his back and flank, consistent with chemical burns by a blistering poison gas such as mustard gas (yperite). These were large expanses of hyperpigmented skin surrounding unpigmented new skin in a "geographic" pattern. According to the victim, the new skin had evolved from vesicles (blisters) filled with clear amber fluid that began to appear one-half to one after exposure to chemical attack. The burns were concentrated where he had been wearing tight-fitting clothes.

Two children were also casualties, but had a different pattern of injury. They showed residual skin burns with areas of skin darkening and induration concentrated on surfaces they said had been directly exposed to poison gas (e.g., the back of hands, face, and upper chest). More than a dozen other refugees showed us skin lesions that had almost completely healed. Their pattern of distribution on face, hands, neck and other exposed skin surfaces was consistent with patients' histories of exposure to blistering chemical agents.

5. Eyewitness accounts, the pattern of symptoms reported, and physical evidence obtained by others point to the use of lethal poison gases including, but not restricted to, sulfur mustard (yperite).

We could not determine the number of chemical munitions used, the scale of attacks, or the chemical composition of agents. The pattern of injury and time-course of symptoms are consistent with observations on victims of Iraqi chemical weapons made by UN investigatory teams from 1984 through 1988. They are also consistent with soil samples taken from Iraqi Kurdistan by British journalist Gwynne Roberts, which revealed degradation products of sulfur mustard. Eyewitness accounts of deaths beginning within minutes of exposure, however, cannot be explained by mustard gas alone. The sum of the evidence is most consistent with use of at least one agent in addition to sulfur mustard.

Diyarbakir refugee camp, Turkey, October 1988. (PHR)

Excerpt from Video Interview, Mardin Camp:
Eight-Year-Old Aagiza, Ekmala Village

Soon after dawn on August 25, 1988, eight-year-old Aagiza was tending the family livestock a few hundred meters from her home in Ekmala, a mountain village in northern Iraq. She looked up when she heard two aircraft flying over the village, and watched them drop bombs, one of which hit near her home. Both her parents and her brother were standing near the house. Seconds later, it exploded with a "poof," not a loud explosion. She described the events to us.

> "It made smoke, yellowish-white smoke. It had a bad smell like DDT, the powder they kill insects with. It had a bitter taste. After I smelled the gas, my nose began to run and my eyes became blurry and I could not see and my eyes started watering too. And I still have some of the effects like my blurry vision and I have these things [darkened skin blisters] over my chest. I saw my parents fall down with my brother after the attack, and they told me they were dead. I looked at their skin and it was black and they weren't moving. And I was scared and crying and I did not know what to do. I saw their skin turn dark and blood coming out from their mouths and from their noses. I wanted to touch them, but they stopped me and I started crying again."

She soon joined her grandmother, another brother, and three sisters to begin a trek over high mountain passes to southeastern Turkey. Her eyes watered, her skin burned, her nose ran, and she had difficulty breathing. She spoke to no one for over four weeks, and began to talk only a few days before the PHR team entered the refugee camp near Mardin.

At the time of the PHR investigation, the surviving members of this Kurdish family had been living in the tent camp for a month, and winter was approaching in the highlands. They had no idea where they would be in a week or thereafter.

IRAQI USE OF CHEMICAL WEAPONS IN KURDISTAN

BACKGROUND ON THE MISSION

On August 25,1988, Iraqi armed forces dramatically escalated a military campaign against the Kurds in northern Iraq. From August 25 through September 5, 1988, more than 50,000 Kurds fled into Turkey [1], after which Iraqi forces sealed the border, thereby preventing further emigration. Initial press reports stated that the Kurds had left Iraq because of large-scale attacks by chemical weapons. Statements from Turkish military doctors examining the sick refugees noted that the wounds were compatible with mustard-gas poisoning [2]. On September 2, 1988, the Iraqi News Agency quoted Iraq's Foreign Minister "strongly denying the use of chemical weapons in northern Iraq" [3].

Subsequent reports were mixed about whether or not injuries of the Kurdish refugees were due to poison gas. Some reporters quoted Turkish doctors and nurses as saying that they were treating cases of chemical weapons injury [4], while others quoted doctors who attributed their findings to natural causes or endemic illnesses [5]. On September 9, 1988, the Turkish Foreign Ministry announced it had "no evidence" that Iraqi refugees were suffering from chemical weapons injuries [6]. An investigatory team of staff from the U.S. Senate Foreign Relations Committee visited the southeastern border region September 12-15, and on September 21 reported "overwhelming evidence" that Iraq had used poison gas [7]. The conclusion was based principally on eyewitness accounts and the absence of alternative explanations for the sudden mass exodus of Kurds. A week later, however, a widely read Op Ed piece by Milton Viorst in the Washington Post questioned whether Iraq had used lethal poison gas against the Kurds [8].

The Secretary General of the United Nations requested that a team of chemical weapons experts investigate the allegations of poison gas use against the Kurds, but the request was denied by the governments of Turkey and Iraq. The Turkish Foreign Ministry representative, in particular, asserted that Turkish medical experts had "found no trace or evidence of chemical weapons" and argued that a UN investigation was unwarranted because it would "create a wrong impression that Turkish medical experts are inadequate to make related research" [9].

Physicians for Human Rights (PHR) and many other human rights organizations were alerted early in September about the alleged use of lethal poison gas against the Kurds of northern Iraq. The ability of international groups to investigate the case was in doubt because the Kurds in question live within the borders of Iraq, and the Iraqi government had declared the matter "an internal issue," not subject to international inquiries [10]. PHR resolved to send a team of physicians to investigate the allegations of lethal poison gas and to assess the medical condition of the refugees in southeastern Turkey. Three of us departed for Turkey on October 6 and returned October 17, 1988.

Investigations of chemical warfare are ideally made by a team with immediate access to sites of alleged attacks, the ability to examine victims, special equipment to detect chemical agents, and means to gather physical evidence for analysis. We were well aware that an ideal investigation was not possible. We did not expect to find unexploded munitions, contaminated soil, or other direct physical evidence. We attempted as rigorous an analysis as possible given the circumstances, and we prepared a detailed questionnaire specifically for the mission [11].

Excerpt from a Video Interview in Mardin Camp:
70 year-old woman, Fanmya, Mylich Village

"It was early morning, we had not had our breakfast yet, around 6:00 or 6:30, the airplane came over and dropped some bombs and a blackish white smoke came out and all of a sudden my eyes became blurry, my nose started running, my skin started itching and I became short of breath and felt terribly weak. It had a very bad smell like garlic and my mouth became bitter. About two minutes later, I began to feel sick and after that my skin felt like it was burning. I saw a lot of animals die before I felt sick -- birds, chickens, hens, cattle, sheep, goats. And then I had difficulty breathing, my skin was burning, my eyes wer burning, and my nose was running. There was water oozing from my skin -- my face and hands. The fluid was coming out yellowish, coming out from my skin which was severely burning and itching too.

"I was 300 to 500 meters away from the attack and there was no rain and it was sunny. For several days I could not eat because I was throwing up a yellow material. Before the attack, my village had 500 to 1,000 people, but only ten were there at the time of the attack. The others had left because they were afraid of an attack. We saw three people die in that attack. Their skin turned black and their clothes were stuck to their skin.

"They helped me, my fellows. They lifted me up, we went 50 feet. They put me down. They rested. We went another 50 feet and so on, because I was very weak. I could not walk. Mostly my son helped me out, while he was carrying me on his shoulder, the smell and fumes from my clothing made him sick and he got a runny nose and runny eyes and he became dizzy, as well as my daughter. When she washed my clothes and her father's clothes she became sick."

METHODS

We succeeded in gaining access to two refugee camps, one near the city of Mardin and another near Diyarbakir. We relied on two methods to gather the majority of data from eyewitnesses to alleged chemical attacks: videotaped interviews lasting from ten to thirty minutes, and the questionnaire survey.

We entered the camps after negotiating for access with local Turkish authorities. As we entered the camps, we were first greeted by a small group of men. We conversed with them and explained that we were attempting to assess the medical status of Kurdish refugees, particularly the reports of exposure to poison gas. In each camp, we quickly found several English-speaking camp residents, with whom we spoke about our mission. They later helped administer the questionnaire under our supervision. A Kurdish-speaking member of our team conducted the videotape interviews, translating questions into Kurdish for those interviewed and answers into English for the camera.

We asked those who claimed to be survivors of poison gas attacks to go to a central location in the camp, where they could fill out the questionnaire under our supervision. We also walked through the camp to conduct videotaped interviews of those claiming poison gas exposure. The interviewer asked refugees to describe the events preceding their migration from Iraq to Turkey. Follow-up questions elicited further details. When subjects reported severe symptoms or the death of animals, for example, they were asked for details about how long it took for symptoms to appear and the sequence in which animals and people died. We interviewed eyewitnesses of both sexes, and across the age spectrum. There was some overlap between those interviewed and those completing the questionnaire, but not all those interviewed answered the questionnaire, and many who filled out questionnaires were not interviewed on videotape.

The team explained the survey process and trained interview assistants before beginning to administer the questionnaire. We asked the English-speaking assistants and others gathered nearby to find camp residents from villages where chemical attacks were alleged to have occurred. We administered the first questionnaire while several camp residents watched and asked questions about the meaning of specific items. We trained several survey assistants in each camp this way.

The questionnaire itself consisted of 120 multiple choice and open questions on circumstances surrounding the attacks and medical effects on the respondent (see Appendix B). Questions elicited personal characteristics and the home village of the respondent; the conditions and timing of the alleged attack; the method of attack and characteristics of the munition; proximity of the respondent to the bomb-burst and description of casualties; and a long checklist of symptoms and effects (see Tables 1-5, Appendix C). In addition, we asked each respondent to describe events in his or her own words and to draw a diagram depicting the geography of the village, the location of the attack, wind direction, and other features of the attack.

We selected respondents from among the people assembled from towns on our list. The only sampling criterion was an emphasis on obtaining respondents across a full age range. We had no prior knowledge of the respondents' histories, other than residence in one of the listed villages. Respondents were physically separated to ensure independent responses. Kurdish assistants who helped translate or clarify questions came from different villages than the respondents.

We encoded the responses, entered the data into a computer database, and analyzed them using EPIINFO epidemiological and statistical packages [Centers for Disease Control, Atlanta, GA].

"Using your own words, can you please describe what happened?"
Response from case 18, Berjini Village

"It was about 6 o'clock in the morning when six airplanes appeared in the sky. They were turning around and two of them dropped some bombs which when they exploded had a very muffled sound. We were not used to that sound. After that, I looked around. I do not know how far it was, but I could see a cloud with a dark yellowish color spread into the village. I could see from far away the animals were dying, but I could not see anybody at that time standing up or walking around at the time the blast happened. But I could smell something like garlic and my mouth tasted bitter and it became difficult to breathe. After the cloud disappeared, we went down and saw that a lot of animals -- birds, goats, sheep, cats, mules -- were dead. And we saw a lot of people dead. I have their names. We counted fifteen people there: Hasansaleh, Hasanaskenda, his son Kurdahasan, his other son Akinhasan, Salahsan, Hewhasan, Anyliamohamd, Disahamed, Mashimosh, Mohamed, Abdul Ahamed, Alymikal, Rumadommohamed, Afamismal, Rhisjoseph, and Asyrihasan. I knew all those people in the village and they were dead. When we looked at them, their skin was dark. We did not touch them. After that, we left the village. We thought this is a poison gas. We left them behind and we went into the mountains to start the trip to Turkey."

RESULTS

Videotaped Interviews

We videotaped approximately four hours of interviews on three tapes. One tape from the camp near Mardin contained interviews with nine primary respondents, twelve other family members who added details, and scenes from camp life. Five of the primary respondents were male, and four female. They ranged from eight to seventy years old. Another tape of interviews from the Diyarbakir camp was sent by special messenger as a precaution against confiscation or loss, but had not arrived as the report was prepared. The third tape was an interview of a physician's assistant, the only medic for the Pesh Merga (Kurdish fighters) we met in either camp. He was not a direct eyewitness to the August 25 attacks, but saw many of the Kurds as they reached the border, and reported a poison gas attack from the Zewashikan region in 1987. He stated the recent attacks caused upper respiratory irritation, redness in the eyes, difficulty breathing, nasal discharge, and blister formation. Some patients had dry coughs and many had small blisters filled with clear yellow fluid. He believed those within several hundred meters of detonations had worse symptoms, and those closest to bomb-bursts had died. He reported some cases of bloody diarrhea and bloody urine among those closer to the detonations, and said the blisters were larger.

Questionnaires

Thirteen residents in Mardin camp, and fourteen in Diyarbakir camp completed questionnaires. The length of time required to fill out each questionnaire and time limitations imposed by camp authorities precluded the completion of more questionnaires. One respondent who reported an attack on June 5, 1987 was excluded from comparative analysis. The remaining 26 respondents came from eight different villages (Table 6, Appendix C).

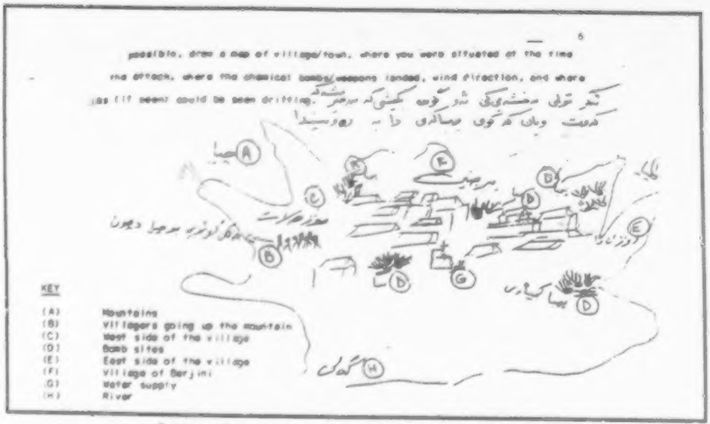
Characteristics of the Population Surveyed

Respondents ranged from six to seventy years old; most were 18 to 59 (Table 7, Appendix C), with a mean of 33.8 years. Two respondents were female. Respondents identified themselves as farmers, housewives, and students (n = 18, 69 percent) or Pesh Merga (Kurdish fighters; n = 8, 31 percent).

Circumstances of the Alleged Attacks

With the exception of the one respondent who referred to an attack in June 1987, all respondents reported that the chemical attacks took place on the morning of August 25, 1988. A single respondent from Berzewrick said an attack was carried out shortly before dawn with rockets. The other 25 reported attacks in early morning by low-flying jets that dropped bombs. Bombs detonated on impact (rather than in the air) and released clouds of substances. An open question on the color and odor of the agents elicited a number of responses (Table 8, Appendix C). The most typical profile was an agent that appeared yellow and smelled of "rotten garlic."

Twenty-five respondents completed responses to question 7: "Using your own words, can you please describe what happened?" Several refugees were able to draw maps of the region of the alleged attacks. A sample map (below) shows the location of houses, nearby geographic markers, and locations of bomb explosions.


6
possible, draw a map of village/town, where you were situated at the time
the attack, where the chemical bombs/weapons landed, wind direction, and where
gas (if seen) could be seen drifting.
A
B
C
D
E
F
G
H
KEY
(A) Mountains
(B) Villagers going up the mountain
(C) West side of the village
(D) Bomb sites
(E) East side of the village
(F) Village of Berjini
(G) Water supply
(H) River

Drawing of chemical attack on village of Berjini by questionnaire respondent.

Analyses of reporting consistency focused on reports from the three villages with six or more residents: Blijan, Ekmala, and Hese. We checked the responses from these villages for consistency, using questions about the time of attack, number of planes involved, number of villagers killed, and number of villagers injured.

One of six villagers from Ekmala and one of seven from Hese were residing in Diyarbakir camp. We were therefore able to compare their answers to those from the same villages living in Mardin camp. There had been no opportunity for communication between the camps. For questions about the time of attack, number of deaths, and number of planes, the responses of the single Diyarbakir camp residents from Ekmala and Hese fell within the range of those recorded in Mardin camp. In the case of number of deaths and number of planes, the Diyarbakir camp residents' answers were the same as the single most common response (the mode) from Mardin camp. On the question of the number of villagers sick after the attack, the lone respondent's answer from Diyarbakir camp fell within range for Ekmala village, but the single Hese villager in Diyarbakir camp estimated fewer deaths than did the five interviewed in Mardin camp. The data are presented in Figure 1, Appendix C.

Symptoms Reported

Simple frequency analysis of responses to the checklist of symptoms revealed a preponderance of eye irritation, respiratory tract symptoms, skin blistering, headache, dizziness, nausea, and vomiting. Symptoms and their frequencies are shown in Table 9, and the ten most frequent symptoms in Table 10 of Appendix C.

One question asked respondents to estimate their distance from the nearest bomb-burst. This allowed us to assess a possible dose response, assuming that those closer to detonations would on average have received greater exposure to poison gas. Distances were divided into three categories: less than 250 meters, 251 to 500 meters, and over 500 meters to closest bomb-burst. Three respondents could not estimate their proximity, and were excluded from the analysis. One respondent was a Pesh Merga soldier who said he had obtained a gas mask from the body of a dead Iraqi soldier. He said he put on the mask as soon as a bomb burst nearby, and so he was also excluded from analysis. The remaining 22 respondents were distributed among distance categories as shown in Table 11, Appendix C.

A categorical variable was created to classify subjects according to severity of symptoms. "High severity" subjects were those who experienced at least the following combination of symptoms:

(1) Eye pain or redness, or eyelid swelling
(2) Shortness of breath or chest pain
(3) Skin blistering
(4) Vomiting

All other subjects were classified as "low severity."

The relationship between distance and severity of symptoms by these criteria is shown in Table 12, Appendix C. Statistical calculation of odds ratios and significance is precluded by the presence of a zero cell and the small counts. None of those more than 500 meters away reported high severity symptoms, while half of those within 250 meters and just under half of those between 250 and 500 meters did so. We do not have sufficient data to reach a statistically significant conclusion, but the responses do provide support for the hypothesis that more severe symptoms occurred in those closest to bomb-bursts, i.e., higher exposure levels caused more severe effects.

DISCUSSION

It is important to review some of the limitations of the study before interpreting its significance. We had no access to those who would have been most severely affected in poison gas attacks because they would either have died soon after the attack or would have been too disabled to make the difficult journey to Turkey. Refugees in the Turkish camps represented only those who could reach the border before it was sealed by Iraqi armed forces, and so came from only a narrow border region of northern Iraq. On this mission, we could only expect to have seen those mildly to moderately affected. In addition, the mission arrived at the refugee camps five weeks after the alleged attacks, sufficient time for minor injuries to have healed. Facilities for laboratory evaluation were unavailable.

We focused on gathering testimony systematically from eyewitnesses to the events. The credibility of testimony naturally then becomes central to the validity of our findings. In anticipation, we designed the investigation to select the relevant people and to elicit detailed information that would allow close analysis of the facts as reported by respondents in a form meaningful to physicians and other specialists. Without a questionnaire, testimony can be misleading and it may be impossible to assess its consistency, thereby calling into question the credibility of the witnesses.

Consistency of Response and Nature of Agents Used

Taken either separately or as a whole, the record of videotaped interviews and questionnaire responses paints a consistent picture of the circumstances of the alleged chemical attacks and their medical consequences. Analysis of questionnaire data on the timing of the attack, number of persons killed, and number of persons injured shows that the experiences of residents in the same village were similar, and distinct from those in other villages. There is close agreement on the nature of the attack itself, with descriptions conforming to those expected from attack by lethal poison gas, and inconsistent with conventional high explosive ordnance.

The pattern of symptoms described by refugees is consistent with exposure to lethal poison gas. Severe irritation of eyes, disturbance of the pulmonary, gastrointestinal, and urinary functions, skin blistering, and physical descriptions of the agents are suggestive of exposure to a lethal blistering agent such as mustard gas. Similar profiles are described by chemical weapon experts in several UN reports that document mustard gas use in the Iran-Iraq war (see

Appendix D). Use of sulfur mustard alone, however, would not explain the common and consistent reports of animals and people beginning to die within minutes of detonation. The latency of sulfur mustard is at least one-half hour, even with extremely high doses [12].

The degree of skin blistering and duration of respiratory tract symptoms are not consistent with harassing agents such as CS (a form of "tear gas"). CS and other agents would also fail to explain the frequent reports of rapid death of animals and people. Severe weakness, seizures, and difficulty moving were not frequently described, and this militates against the conclusion that nerve agents were used, although it does not rule them out.

We conclude that lethal poison gas was used, including but not confined to sulfur mustard. One expert in chemical warfare who reviewed PHR data concluded that the agent best explaining most of our findings is Lewisite [13]. Other experts who have reviewed the data suggest that a combination of nerve agents or arsenicals with sulfur mustard could explain the symptoms reported. The limitations of the interview method, the unavoidable delay in conducting physical examinations, and lack of direct site access preclude us from determining precisely which agent or agents were used in addition to sulfur mustard. But this uncertainty should not obscure the more important conclusion that lethal poison gas was indeed used.

The most compelling evidence that poison gas was used comes from analysis of questionnaire responses. The four symptoms required to meet our criteria for "high severity" are those of ocular inflammation, pulmonary irritation, skin burns, and marked gastrointestinal distress -- effects on 4 different organ systems. The presence of pulmonary or gastrointestinal symptoms alone might not cause surprise in this population, although unexplained skin burns would certainly require some special explanation. The simultaneous expression of injury to all four organ systems, however, is highly unusual. Simultaneous presence of this symptom complex in such a high proportion of our sample (8 of 22 for whom there is complete information) is even more difficult to explain other than as a result of poison gas exposure. None of these symptoms would be expected at anywhere near this frequency. The increased likelihood of severe symptoms with greater exposure levels further supports a causal association.

OTHER LINES OF EVIDENCE

Physical Evidence Gathered by British Journalist

Evidence from a variety of other sources supports our findings and conclusions. Gwynne Roberts, a free-lance journalist on assignment to the Middle East for Independent Television News and Channel 4 in London, undertook a clandestine trip into northern Iraq twelve weeks after the alleged attacks [14]. He was accompanied by a London-based Kurd and a group of Pesh Merga (Kurdish fighters) attached to the Kurdish Democratic Party. Mr. Roberts obtained seven soil samples and exploded bomb fragments from the regions allegedly attacked. Clayton, Bostock, Hill & Rigby, Limited, a British firm that does chemical analysis, identified three compounds from one of the samples taken near an exploded bomb fragment. The British Chemical Defense Establishment at Porton Down also analyzed multiple samples. The private laboratory found 1,4-dithiane, 1,4-oxathiane, and 1,1-thiobis-ethene -- sulfur mustard thermal degradation products -- by mass spectrometry; the government laboratory found soil "relatively heavily contaminated" with sulfur mustard and also detected nine degradation products [15]. No nerve gas or other agents were directly detected, although further analysis for arsenical compounds is still pending.

Eyewitness Accounts Reported by Other Groups Visiting the Region

Eyewitness accounts of chemical warfare were reported by dozens of journalists and other observers. Amnesty International (AI) had a four-person team investigating the human rights situation of the Kurdish refugees in southeastern Turkey at the same time as PHR. The AI team related multiple eyewitness reports of chemical weapon use [16]. The British television group that discovered the physical evidence of mustard gas contamination also videotaped numerous eyewitness accounts of the chemical attacks, taken from persons not in refugee camps (and therefore constituting a separate sample from PHR interviews). Those interviews reported attacks as late as August 29, 1988 [17]. Four Members of Parliament from southeastern Turkey who visited their districts in early September also reported to us that they saw many refugees with large amber-colored blisters who said they had been attacked with poison gas bombs.

Massive Migration from Northern Iraq

Over 50,000 Kurds left Iraq in the week from August 28 to September 5, 1988 [1]. It is undisputed that this mass migration was precipitated by an Iraqi military campaign in northern Iraq which dramatically escalated on August 25. The indigenous population had sustained many attacks by conventional weapons over the past three decades, with intermittent fighting during the Iran-Iraq war (including attacks in mid-1987), yet this time they fled. Those directly interviewed said that they left Iraq to escape further attacks by chemical weapons.

Iraqi Troops Seen Using Gas Masks

More than a week after the alleged attacks, the Iraqi government arranged a tour of parts of northern Iraq for journalists. The tour did not visit areas of most intense combat, helicopters were not allowed to land at village sites, and dozens of videotapes were confiscated afterwards [18]. Nonetheless, the journalists described seeing Iraqi troops wearing gas masks [19]. Chemical defense masks and special clothing are cumbersome and diminish troop efficiency, and it is difficult to explain why Iraqi commanders would require troops to wear such equipment without cause.

Pesh Merga soldiers gave several gas masks and antidote kits (containing atropine and oxime, used to treat nerve gas attack victims) to the British journalist who surreptitiously entered northern Iraq. The Pesh Merga soldiers stated the kits and masks were taken from Iraqi soldiers killed in battle; the instructions were in Arabic (spoken in Iraq, as opposed to Farsi used by Iranians, or Kurdish used by Kurds) [20].

Iraq Refused a United Nations Investigation Despite Having Permitted Such Investigations Before

Iraq rejected a request from the United Nations (UN) to investigate the sites of alleged chemical bombings of late August. The Iraqi government failed to respond to a PHR request for site access. Iraq thus obstructed site access despite having three times permitted UN war zone investigations the year before, during the war with Iran. The reason offered by the Iraqi Foreign Minister was that "the Kurds are Iraqis and it is an internal matter" [21].

Iraq Possessed Chemical Weapons and Had Used Them Against Iran

Finally, Iraq is known to have possessed and used chemical weapons in the war with Iran. This has been documented repeatedly in seven UN missions (see appendix D). The first mission, in 1984, found physical evidence of mustard gas (yperite) in shells and soil samples and also found an unexploded bomb containing the nerve gas Tabun [22]. UN missions since that time have repeatedly examined survivors of poison gas attacks and found physical evidence of mustard gas use. The UN reports show a progressive escalation from use against soldiers to attacks against civilian targets (see appendix D). Thousands of civilians were killed in an Iraqi poison gas attack on the town of Halabja in mid-March 1988 [23]. The northern Iraqi town was held at the time by Iranian forces.

Summary of Evidence

In summary, Iraq possessed chemical weapons and had used them before. A massive migration of Kurds began on August 25, and was finally stopped when Iraq sealed its border to prevent further exit. Kurds in two separate Turkish refugee camps described poison gas attacks convincingly. They reported symptoms consistent with chemical injury, and there was agreement on details of the events, despite there having been no communication between refugee camps. Healing burn wounds were apparent on physical examination. Soil samples taken from Iraqi Kurdistan revealed thermal degradation products of sulfur mustard, and Iraqi troops in the region after the attack were seen wearing gas masks. Iraq thwarted UN investigation despite having previously permitted such investigations in its territory.

INCENTIVES FOR CHEMICAL WEAPONS PROLIFERATION

Barring action by the world community, the Iraqi chemical bombings of late August 1988 could prove a landmark in the spread of chemical weapons. These attacks are distinctive in several respects: (1) they represent use of chemical weapons against an indigenous population by its own government, (2) descriptions of the attacks include both civilian targets (villages) and the Pesh Merga (Kurdish fighters), (3) the attacks precipitated a mass emigration, (4) the UN sought, but was rebuffed in pursuing, an investigation of chemical weapons use, and (5) Iraq has escaped any significant penalties for its use of lethal poison gas.

The Iraqi attacks are most worrisome because they appear to have been successful and were conducted with impunity, which may well tempt other countries to acquire chemical weapons. The Kurds have intermittently fought Iraq for decades in an attempt to gain political autonomy. With chemical bombing, Iraq succeeded in dislodging the entrenched population in one week. The targets included both civilian villages and outposts of the Pesh Merga.

The lack of demonstrated effectiveness and logistical difficulties in making and delivering chemical weapons were important factors constraining their use. Threat of retaliation in kind and improved protective measures have limited incentives to use poison gas. In World War I, chemical defense soon caught up to offense, and neither side gained a sustained advantage by using chemical arms [24]. Iraq, however, appeared to successfully employ poison gas against opponents unable to take protective measures or to retaliate in kind.

VIOLATIONS OF INTERNATIONAL LAW

Iraq's use of chemical weapons against the Kurds highlights several weaknesses in the international agreements that limit use of chemical weapons. Effective international agreements seeking to prevent chemical weapons proliferation must fill these gaps. International law shows a longstanding effort to prohibit the use of particular weapons. The theme of international law, first voiced at the Hague Conference of 1899, is that needless suffering should be avoided. At that time, sixteen nations declared a ban on the use of armed munitions for the distribution of asphyxiating gas.

The Geneva Gas Protocol of 1925 was more specific, but was still couched in broad language. It prohibited "the use in war of asphyxiating, poisonous, or other gases, and of all analogous liquids, materials and devices," and also banned use of bacteriological weapons. Iraq signed the Geneva Protocol.

Iraq clearly broke the Geneva Protocol in its war with Iran. Whether it did so in chemical bombings of the Kurds is less clear. The Kurdish conflict falls within Iraq's border, and the Protocol's referent for "use in war" is not clear. This could be taken to mean only in declared wars, although by convention it has been taken to apply to internal conflicts as well [25]. The Geneva Protocol, moreover, only prohibits use in war, but modern conflicts may never be officially declared wars even as thousands are killed.

Events in Kurdistan illustrate both the ambiguity of what is banned and the absence of verification measures under the Geneva Protocol. Only use of chemical weapons is banned, not possession. In 1972, the United Nations General Assembly adopted the Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction. This prohibits possession, production, and use of biological and toxin weapons. Turkey has ratified this convention, and Iraq has signed but not ratified it. Under terms of the Convention, alleged violations are to be taken to the United Nations Security Council for its investigation and report. In the case of the late August bombings in Kurdistan, Iraq was successful in blocking the UN General Secretary's request for an investigation. One could argue that chemical weapons, as opposed to biological and toxin weapons, fall outside the Convention.

Some authorities argue, however, that since 1975, when the Convention on the Prohibition on the Stockpiling of Toxin Weapons entered into force, the use of chemical and biological weapons are prohibited. Von Glahn notes that "In view of the fact that 128 countries are now bound by the Protocol, most writers today agree that the Geneva instrument is binding on all states through the general rule of customary international law springing from the provisions of the Protocol" [26]. Use of poison gas is banned by the cumulative authority of (1) the Geneva Protocol, (2) the 1972 UN Convention, and (3) customary international law dating back at least to 1899.

The "rolling text" draft of the Chemical Weapons Convention being negotiated in Geneva would plug many of the holes in existing international law. As currently formulated, this convention would prevent the development, production, acquisition, transfer, or use of chemical weapons, or preparations for use. It would ban possession of specified supertoxic lethal chemicals, other lethal and harmful chemicals, precursors, key components of binary or multicomponent chemical weapons systems, and enhancement chemicals (those intended to increase the longevity or effectiveness of other agents). It would also ban devices designed to deliver chemical weapons and facilities for production of chemical weapons or devices to deliver them. Some chemicals specified in "schedules" (lists) would be subject to special controls. Verification would include demand inspections. Negotiators are focusing currently on the specifics of which agents to include for special protections, how to differentiate different categories of scrutiny, and how to ensure verification. What triggers an investigation and how to pay for personnel and activities to carry out the terms of the convention are also being negotiated [27].

Even if Iraq did not violate international law on use of poison gases in the late August campaign against the Kurds, it clearly violated the International Covenant on Civil and Political Rights. That Covenant states in Article 6(1) that "Every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life." Iraq ratified this Covenant on January 25, 1971.

Bombing of civilian Kurdish villages with poison gases that kill and maim indiscriminately is a clear violation of this Covenant. This makes the matter international in character. It legitimates international investigation and justifies collective actions, such as economic or political sanctions, to prevent further abuses [28].

A NOTE ON THE ROLE OF TURKISH DOCTORS

We attempted to meet with doctors in the Hakkari Province who had treated the first wave of Kurdish refugees. We were not able to do so (see Appendix E), and attempted to piece together the role of Turkish physicians from secondary sources. The role of Turkish physicians is important because they became the single most important source of information about a premeditated public health disaster. Several journalists and other observers told us that in the days following the influx of Iraqi Kurds, they spoke with Turkish doctors who ascribed the burn injuries they were seeing to poison gas attacks. Those same journalists and diplomats noted that the doctors' stories changed after the Turkish Foreign Ministry made its official statement that there was "no evidence" chemical weapons were used. The Turkish doctors involved had no previous experience with chemical weapon injuries [29].

The Amnesty International delegation met with eight Turkish doctors whom officials said had examined refugees allegedly exposed to chemical attacks. The doctors told the AI delegation that in the absence of visible signs of the use of chemical weapons, no laboratory tests (even of blood or urine) had been carried out on the nine victims examined. The doctors had neither visited the camps nor examined other refugees for traces of chemical agents [16].

Four Members of Parliament from the Social Democratic Populist Party, representing southeastern Turkey, told us that six doctors from the Hakkari Province wrote a report concluding chemical weapons were used, including analysis of blood tests, histories, and physical findings. One European doctor reported to us after we returned to the United States. He interviewed Turkish physicians that he had interviewed the doctors responsible for investigating chemical weapons use for the Turkish government. They told him that the doctor heading the treatment team declared that further investigation, including blood and urinary tests, was not necessary. They admitted "we did not do a thorough investigation" [30].

Diplomatic sources reported that at least two, and as many as six, autopsies were performed in Diyarbakir by Turkish doctors on those injured in the attacks. The autopsy reports have not been made available, despite their obvious international significance.

Doctors, quoted in press coverage of the Kurdish refugees, hedged on the crucial question of whether or not chemical weapons had been used. Ahmet Azboy, a Turkish doctor treating refugees in the camp near Silopi, confirmed that he was treating first-degree burns, but declined to speculate on their cause [31]. Sinan Seyfioglu, a doctor in Diyarbakir, was quoted as saying that doctors could not determine the cause of the many deaths among refugees, and he could not confirm or deny the use of chemical weapons. He went on to say "These people have been on the road for days. They suffer from exhaustion and various infections, including eye infections....This does not mean Iraq did not use poison gas, but if these people had been exposed, I don't believe they could have made it over here" [31]. Mustafa Yildez, a doctor with Turkish Red Crescent (the equivalent of Red Cross in Islamic nations) who treated refugees in the camp near Diyarbakir, was quoted saying "I don't see in this population signs of chemical bombs" [32].

The Interior Minister of Turkey, Mustafa Kelemli, is a physician. He asserted that "Turkey has nothing to hide," and assured reporters that "Turkey would let the facts be known" if there were medical evidence of poison gas use. He said that a special team of doctors was sent to the border region to investigate claims that many refugees were suffering the effects of chemical gas attacks, but "no one case proving the use of chemical weapons has been brought to the attention of our ministry" [33].

The role that physicians played in investigation of poison gas attacks is not clear. Their ethical obligations to pursue such investigations, to report their results to international authorities, or to refer the matter for investigation by an international body are also ambiguous. Physicians were obligated to treat patients brought to them. Such treatment would have required the most specific diagnosis possible. It is unfortunate that blood, urine, and tissue samples were not taken for analysis. The international community now knows that lethal poison gas was used, but does not know which specific agents were used in addition to sulfur mustard.

If conclusive investigations were undertaken but not reported, then this raises the question of whether doctors have an obligation to report violations of international law to national and international authorities. The World Medical Association Regulation in Time of Armed Conflict states that "In emergencies, the physician must always give the required care impartially and without consideration of sex, race, nationality, religion, political affiliation or other similar criterion. Such medical assistance must be continued for as long as necessary and practicable" [34]. Codes of ethics for physicians are silent, however, on a duty to report abuses of human rights. Not even the Declaration of Tokyo (a World Medical Association document dealing with physicians and torture) includes a duty to report abuses [35]. The International Council of Nurses does explicitly require that "nurses having knowledge of physical or mental ill-treatment of detainees and prisoners take appropriate action including reporting the matter to appropriate national and/or international bodies" [36] in caring for detainees or prisoners. The ambiguity of physician obligations in the case of chemical weapons use in Kurdistan will apply to other situations in the future, when physicians become the arbiters of knowledge crucial to deciding about violations of international law.

RECOMMENDATIONS

1. All governments, particularly the Iraqi government, should abide by existing international law prohibiting use of chemical weapons.

2. International law should be amended to explicitly prohibit use of chemical weapons in internal conflicts carried out by armed forces.

3. Pursuit of the Chemical Weapons Convention should be vigorously pursued, and an agreement signed soon.

Any new convention for control of chemical weapons should prohibit the development, production, and use or lethal poison gases and other forms of chemical weapons as well as munitions designed to deliver them. Although no agreement can be perfectly verifiable, the world community is clearly better off with some further restraint to chemical weapons proliferation, rather than without it. Sanctions against use of poison gas must be clarified and strengthened. Only international agreement and collective actions can accomplish this. In the case of the Iran-Iraq war, Iraq used poison gas with impunity. In a May 1987 report documenting the use of mustard gas in the Iran-Iraq conflict, a group of UN experts expressed their frustration, noting that:

> While we are fully aware that all weapons are lethal and destructive, we wish to emphasize that chemical weapons are inhuman, indiscriminate in their action, and cause long-term disabilities and suffering. It is vital to realize that the continued use of chemical weapons in the present [Iran-Iraq] conflict increases the risk of their use in future conflicts....We all believe that at the specialist level, we have done all that we can do to identify the types of chemicals and chemical weapons being used in the Iran-Iraq conflict...technically there is little more that we can do....In our view, only concerted efforts at the political level can be effective in ensuring that all the signatories of the Geneva Protocol of 1925 abide by their obligations [37].

Consequences of violating a chemical weapons convention must be serious enough to make the agreement an effective deterrent.

4. National and international health professional organizations should encourage physicians to report human rights abuse, should act to protect those reporting abuses, and should clarify the ethical obligations of physicians not only to treat but also to report human rights abuse and other violations of international law.

Physicians have a special role because they so often become gatekeepers to critically important information. The role of Turkish physicians in investigating or failing to investigate the cause of the burns they were treating highlights the importance of clarifying the moral obligations of physicians, and points to a role for professional groups -- such as PHR and other organizations -- to investigate violations of international law and abuse of human rights. Regarding allegations of poison gas bombings in northern Iraq, the UN was successfully prevented from mounting an investigation, and other international health organizations failed to act. Turkish physicians failed either to investigate events of obvious importance or to report the results of such an investigation to any internationally recognized body. International organizations such as the World Medical Association should encourage physicians to report systematic abuses of human rights, devise ways to facilitate this process, provide protection for physicians risking their lives or careers, and explicitly articulate the duties of individual physicians learning of human rights abuse through exercise of their professional skills.

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APPENDIX A: LIST OF REVIEWERS

The authors and Physicians for Human Rights, as an organization, gratefully acknowledge the contributions of those on the list below, who read and commented on drafts of this report. The reviewers have greatly improved the quality of the report. The reviewers and others who helped are not responsible for our findings and conclusions, however, and their appearance on this list does not imply agreement with all points in the document.

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APPENDIX B: QUESTIONNAIRE ADMINISTERED TO REFUGEES

چەند پرسیارێک لە لایەن کۆمەڵەی پزیشکان بۆ مافی
داسق مرۆڤایەتی - چەکی کیمیاوی

9/27/88 QUESTIONNAIRE
PHYSICIANS FOR HUMAN RIGHTS
CHEMICAL WEAPONS

I. Administrative

1. Interview number:___ 2. Date:__/__/__ 3. Interviewer:_________
ژمارەی گفتوگۆ مێژوو mo day yr مانگ ڕۆژ ساڵ گفتوگۆکەر

4. Interpreter:____________ 5. language used:____________
گێڕەر بەچ زمانی

6. Interpreter's occupation, position:________________
پیشە و پلەی گێڕەر

II Background and Personal History of Respondent
مێژووی گفتوگۆکەر

1. Respondent's name (optional): ____________________
ناو گەر ئەتوێت

2. Current place of residence: ____________________
ئێستا لە کوێ دەژیت

3. Last place of residence (if 2. is temporary): ________________
جاران لە کوێ دەژیایت

4. sex (M/F): __ 5. age (yrs): ____ 6. Nationality:______________
(مێ/نێر) جنس چەند ساڵتە وڵات نامە

7. Before the attack, how would you describe your physical condition (health) compared to other persons of your age? Would you say your physical condition was:
پێش لە هێرشەکە تەندروستیت چۆن بوو؟

excellent-- 1 good--2 fair--3 poor--4
باش نەبو   نیوە باش   باش   زۆرباش

8. During the year before the attack, what illnesses were you treated for? About how long ago was this?
پێش ئەم هێرشە بۆ چ نەخۆشیەک تیمارکراویت؟ ئەوە کەی تیمارکراوێت

illness, description of symptoms	time (no. months since tx began)
باسی نەخۆشیەکە بکە	مێژوو
______________	______________
______________	______________

9. Before the alleged attack, please put check mark beside any disease you had:
پێش هێرشەکە چ نەخۆشیەکت بوە

description, if yes

- __ ear disease:
  گوێ ئێشە
- __ eye disease:
  چاو ئێشە
- __ nose or throat disease:
  لوت و گەروو ئێشە
- __ chest disease:
  سنگ ئێشە
- __ stomach (GI tract) disease:
  زگ ئێشە
- __ urinary tract disease:
  نەخۆشی گورچیلە
- __ skin disease:
  نەخۆشی پێست
- __ fever:
  لەرزو تا

10. We would like to ask more questions about your health problems you had before
ئایا تەندروستیت چۆن بوە لەپێش هێرشەکەدا
the attack. Have you had the following for several weeks or longer:
ئایا ئەم نەخۆشیانەت هەبو

- __ a skin rash/sores that didn't heal
  پەڵەی پێست ، زامی پێست

_ itchy skin
الوش پیست

_ a fever
تا

_ dizziness
گیژی

_ any blood in your stools
خوین لەناو پیسیدا

_ loose stools
سک چون

_ pain in your abdomen
سک ئێشە

_ recurrent vomiting
رشانەوە

_ blood in your vomit
خوین لناو رشانەوە

_ recurrent discomfort or pains in the chest
سنگ ئێشەو آزار

_ difficulty breathing when lying down
تەنگە نەفەسی کاتی پاڵ کەوتن

_ your chest sometimes beat very fast even when not exerting yourself
پەلە کردنی دل لەکاتی بیشو دانا

_ continuous cough
کۆخە

_ coughed up blood
خوین لناو کوخە

_ coughed up a greenish slime
بەلغمی سەوز

_ coughed or took a deep breath that gave you a pain in the chest
سنگ ئێشە لەکاتی کوخین

_ sudden attacks of coughing
کوخەی بە تنگ

_ headaches
سەر ئێشە

_ pains in your eyes
چاو ئێشە

_ yellowness in the white of the eyes
زەردبوی چاو

_ blurred or double vision
یەک بە دو بینین

_ sores in the corners of your mouth
زامی لیو

_ white, tender patches in your mouth
زامی سپی ئێش دار لەناو دەم

_ nose bleeds
بەر بونی خوینی لوت

_ neck pains
مل ئێشە

_ pains in one or both legs
قاچ ولاق ئێشە

_ stiff joints
رەق بونی جومگە

_ swollen or painful joints
ئێش و آوساوی جومگە ی ضەری

_ difficulty sleeping
بێخەوی ی خەوەی

_ loss of appetite
نەخواردن

III. Events of alleged chemical attack
رووداوەکانی چەکی کیمیاوی دەکو وەشانی
کراوە

1. were you present at the time of an attack? yes---1 (go to question 3)
بەلی آیا لەکاتی هێرشەکە لەوێ بویت
no ---2
نا

2. If not, how long after the attack was it before you visited the site?
ئەگەر لەوێ نەبویت چەند دوای هێرشەکە تۆ چویت بو شو شوێنە

same day----	00	6 days after----	06
هەمان رۆژ		حەفتەم رۆژ	
next day----	01	7 days after----	07
دووەم رۆژ		هەشتەم رۆژ	
2 days after---	02	8-14 days after-	08
سێیەم رۆژ		هەشت تا چواردە رۆژ	
3 days after----	03	15-21 days after--	09
چوارەم رۆژ		١٥ تا ٢١ رۆژ	
4 days after----	04	22-28 days after--	10
پێنجەم رۆژ		٢٢ تا ٢٨ رۆژ	
5 days after----	05	29 or more after--	11
شەشەم رۆژ		٢٩ یا پێتر	
		never at site--------12	
		هەرگیز نەچویت	

3. Have you been present during an attack on more than one occasion?
آیا لە یەک هێرشت پتر دیوە

a) yes----1 no-----2
بەلێ نە

b) If yes, specify the locations and dates of the attack. (List the most recent attacks first).
ئەگەر دیوتە پیمان بلێ لە کوێ بووە و کەی بوو باسی ئەم هێرشە تازەیە بکە

	Location شوێن	Date مێژوو
	____________	____________
	____________	____________

4. Where did the attack under review occur? ____________
ئەم هێرشە باس ئەکەین لە کوێ بوودا

5. Approximately how many people lived in the village/town then?: ______
چەند کەس لەو گوندە بوون کە هێرشی کرایە سەر

6. What was the date and time of the attack? date: __ __ __
مێژوو چ ڕۆژ و کاتێک هێرشەکە ڕوویدا
month date year
ساڵ ڕۆژ مانگ
چ کاتێک بوو time of day: ____________

7. Using your own words, can you please describe what happened.
بەو شێوەی کە دیوتە بۆمان باس بکە چۆن هێرشەکە ڕوویدا؟

8. If possible, draw a map of village/town, where you were situated at the time of the attack, where the chemical bombs/weapons landed, wind direction, and where gas (if seen) could be seen drifting. ئەگەر توانی نەخشەیەک شوێنەکە بکێشە کە بۆمبەکە کەوت و بای کە گوێ جیاکری دا بە نەوەسیدا

9. Approximately how many people died in this attack? ______
بە نزیکەیی چەند کەس مردن بەم هێرشە

10. Approximately how many people became sick (but did not die) in this attack?: __________
چەند کەس نەخۆش کەوتن بەم هێرشە

11. What was the weather like at the time of the attack?
هەوا و سروشت چۆن بوو ڕۆژی هێرشەکە

bright, sunny—1 cloudy—2 rainy—3
هەتاو هەور باران

hazy-----------4
تەم

other (specify): ________________5

12. What were you doing at the time of the attack?: ______________

تۆ چیت ئەکرد لەکاتی هێرشەکەدا

13. Where were you at the time of attack?

لەکوێ بویت لەکاتی هێرشەکەدا

outside------------------ 1
لەدەرەوە
in a motor vehicle ------ 2
لەناو ئوتومبێل
in an open shelter ------- 3
لەناو چاڵ
in an enclosed shelter---- 4
لەژێر زەوین
in an enclosed shelter---- 4
لە ژێر زەوین
other (specify): __________ 5
کوێ تر
not applicable (not present)--9

14. What method was used to deliver the attack? (check all that apply)

بە چی شێوەیەک بۆمباکەیان ئاوێشت

aircraft bomb--------1
فرۆکە
aircraft spray-------2
فرۆکەی ئاوڕشێن
rockets-------------- 3
صاروخ
artillery ---------- 4
تۆپ
mortar ------------- 5
ڕشاش
uncertain ----------- 6
نازانر آوە
other (specify)________ 7
چی تر

15. Estimate how far away you were from the actual site of detonation or spraying in meters:

چەند هەنگاو دور بویت لە جێگای تەقینەوی بۆمباکە

__________meters

uncertain or don't remember--1
نازانم ، بیرم نیە
not applicable (not present)--2
لەوێ نە بوم

16. If an aircraft was involved in the attack, do you know what type of aircraft it was? (If no aircraft involved, go to question 19).

ئەزانی چ فرۆکەیەک بۆمباکەی هاوێشت

helicopter----------------1
هالی کوپتر
jet-----------------------2
نفاثە
propeller-driven----------3
فرۆکەی پەروانە دار
uncertain-----------------4
نازانم

17. numbers of aircraft involved: __________

چەند فرۆکە بەش داریان کرد

18. How many times did the aircraft attack? __________

بۆمبا یا تۆپەکە یا سارۆخەکە بە ئاسمانەوە تەقینەوە یا لەزەوی

19. Did the bomb/rocket/shell explode in mid-air, or on the ground?

بۆمبا یا تۆپەکە یا سارۆخەکە بە ئاسمانەوە تەقینە و یاکە دای لە زەوی

ground burst--------------- 1
لە زەوی
air burst------------------ 2
لە ئاسمانەوە
some on ground, some in air- 3
هەندی لە زەوی ، هەندی لە ئاسمان
uncertain------------------ 4
نەزانراوە

20. Did the bomb/rocket/shells that exploded produce any clouds?

کە تەقینەوە هەوریان پەیدا کرد

yes--1 بەلی
no--2 نەء
uncertain-3 نازانم

21. If yes, what color was the cloud/spray? ______________

چی بو ڕەنگی هەورەکە

22. Did the cloud/spray have an odor or taste?

هەورەکەیان تەمەکە بۆن و تامی هەبو

yes----------1
بەلی
(describe the odor: ____________________)
باسی بۆنەکەی بکە
no-----------2
نەء
uncertain----3
نازانم

23. Did any of the cloud/spray fall on you or did you touch any of the substance?

هیچ لە هەورەکە یان غازەکە بەر تۆ کەوت ! یا دەستت لێ دا

yes--1 بەلی
no--2 نەء

24. How did the substance feel when it touched your skin? (Circle all that apply).
هەستت بە چی کرد کە غازەکە بەر پێست کەوت

sticky
لینج بو
wet
تەڕ بو
hurt
آزاری هەبو

hot/burning
ئەسوتایەوە
dry
وشک بو

cool
سارد بو
itchy
آلوشی کرد

25. check symptoms of pain or suffering brought on by the attack:
باسی آزارو ئێش بکە دوای هێرشەکە ، کە بەسەرت هات

_ eye pain
چاو ئێشە
_ redness in eyes
چاو سوری
_ swelling of eyes/eye lids
آوسانی چاو
_ double vision
یەک بە دو بینی
_ tearing of eyes
فرمێسک زور
_ whites of eyes turned yellow
زەردویی چاو
_ burning eyes
سوتانەوەی چاو
_ temporarily blinded
نەبینین بو ماوەی کەم
_ dry throat/mouth
گەرو وشک بون
_ taste left in mouth
تامی دەم گورین
(specify: ____________)

_ soreness of throat
گەرو ئێشە
_ tightness of throat
تەنگی گەرو

_ itching nose
لوت خوران
_ burning nose
لوت سوتانەوە
_ dry nose
لوت وشک بون
_ bleeding nose
خوێن بەربونی لوت
_ increased nasal secretions
چلمی زور
_ clear discharge
آوی لوت
_ yellow discharge
چلمی زەرد
_ red discharge
چلمی سور
_ pain in ears
گوی ئێشە
_ blistering of ears
زامی گوێچکە
_ loss of hearing
کەر بون

_ stiff neck
مل رەق

25. symptoms (continued)

_ burning of throat
گەرو سوتاندن
_ hoarseness of throat
دەنگ نوساندن
_ swollen lips
لیو آو سانەوە
_ mouth ulcers
زامی دەم
_ blisters around mouth
زامی لیو
_ bleeding from mouth
خوێن لە دەمەوە
_ swollen tongue
آوساوی زمان
_ increased salivation
لیک زور بون
_ other mouth symptom: ____________

_ difficulty breathing
تەنگە نەفەس
_ tightness of chest
سنگ توند بون
_ shortness of breath
نەفەس توند بون
_ wheezing
فیزەی سنگ
_ chest pains
سنگ ئێشە
_ burning sensation in chest
سوتانەوەی سنگ
_ choking feeling
هەست بە خنکان
_ dry cough
کوخەی وشک

_ swelling of neck
آوسانی مل

_ skin itching
آلوشی پێست
_ burning sensation, skin
سوتانەوەی پێست
_ blistering of skin
زامی پێست
_ rash
پەلە
_ skin discolored
گورانی رەنگی پێست
(color: ____________)
رەنگی

_ swelling of joints
آوساوی جومگە
_ pain in joints
ئێشی جومگە
_ muscle tremors (fasciculation)
لەرزینی ماسولکە
_ generalized body tension
آزاری هەمو لەش

_ loss of appetite
نەخواردن
_ fever
تا
_ sweating
عارەق کردن

25. symptoms (continued)

_ cough with sputum
کوخەو بەلغم
(color: ______)
رەنگی
_ blood in sputum
بلغەی خوێنین
_ stomach/abdominal pains
آزاری سک
_ swelling of abdomen
آوساوی سک
_ nausea
دل تێک چون
_ vomiting
رشانەوە
_ blood in vomit
رشانەوەی خوێنی
_ diarrhea
سک چون
_ blood in diarrhea
خوێن لە ناو پیسی
_ bleeding from rectum
خوێن لە پشتەوە
_ painful urinating
آزاری میز

_ dizziness
گێژی
_ headaches
سەر ئێشە
_ loss of consciousness
بێ هوش بون
_ difficulty walking
بێ هێزی
_ disoriented
بێ سەر و شوێن
_ convulsions
[illegible]
_ drowsiness
خەوآلو
_ insomnia
بێ خەوی
_ visual acuity
چاو تەژی
_ photophobia
چاوئێشە بە روناکی
_ myoclonus
چاو پڕ بون
_ others: ______
هتد
______

26. Did you receive any help or medical treatment? yes--1 no--2
نەڕ بلی چ تەداوی کرایت ، یا یارمەتیان دایت

27. If yes, how many days after attack: ______; where: ______
لەکوێ ئەگەر تەداوی کرایت دوای چەندرۆژبو ولەکوێ

28. Are you still suffering from the effects of this attack? yes--1 no--2
آیا ایستاش آزارو ئێشو ناخۆشیت هەر ماوە؟

29. Tribal/ethnic group: ______
لەچ عشیرەت یاگوندێکی

30. principal language spoken: ______
بەچی زمانی گفتوگۆ ئەکەن

31. current status:
ایستا چی
(circle as many as apply)
1. refugee
آوارە
2. guerrilla fighter
پێش مەرگە
3. soldier
سەرباز
4. person living in area of attack, not displaced
خەلکی شوێنە بوت کە هێرشیان کردە سەر
5. others: ______
هتد

32. occupation: ______
ئیشت چیە
11. years of education: ______
پلەی زانیاری

33. Has any member of your family died within the last 12 months?
آیا هیچ کەسێک لە خێزانتان مردون لە١٢ هەیڤی را بوردوا

yes--1 (specify relationship: ______)
بلی
کێت بو
no--2
نەڕ

34. Are you currently separated or living apart from members of your family?
آیاتو ایستا لیرە بە تنها ئەژیت ، ویا کەس لە خێزانت دور خراونەکرو؟

yes--1 no--2 comments, if necessary: ______
بلی نەڕ بلی بەکەوبان

V. OPTIONAL QUESTIONS

Based on whether further inquiry is desired to document source of poisoning, or verify that chemical effect also evident in animals and plants.

(A). Water source: 1. identify source of drinking water: ______________

2. did subject drink this water after attack?

If yes, how many days after attack? ______________

3. record symptoms, time of onset after drinking

water: ______________________________

4. did water have strange color? If yes, what? _______

5. strange odor? If yes, what? ______________

(B). Animals: 1. identify animals present at site of attack:

____

2. describe how they were affected by attack, including timing of symptoms, whether they drank water, whether any died, etc.

____

(C). Plants: 1. Did subject see anything on plants? If so, describe: ______________ (including color)

2. Effect on plant: ______________________

(TO BE ATTACHED TO QUESTIONNAIRE BY INTERVIEWER AFTER INTERVIEW)

VI. Assessment of Respondent

1. How confident are you that the interpreter accurately translated the meaning of all questions?

confident									not confident
1	2	3	4	5	6	7	8	9	10

2. How certain or uncertain would you say the respondent was in providing testimony on:

	certain									uncertain
description of attack	1	2	3	4	5	6	7	8	9	10
description of agent	1	2	3	4	5	6	7	8	9	10
his/her medical history	1	2	3	4	5	6	7	8	9	10
description of signs and sx	1	2	3	4	5	6	7	8	9	10
animal evidence	1	2	3	4	5	6	7	8	9	10
plant evidence	1	2	3	4	5	6	7	8	9	10

3. Overall, how reliable is the information given by this respondent?

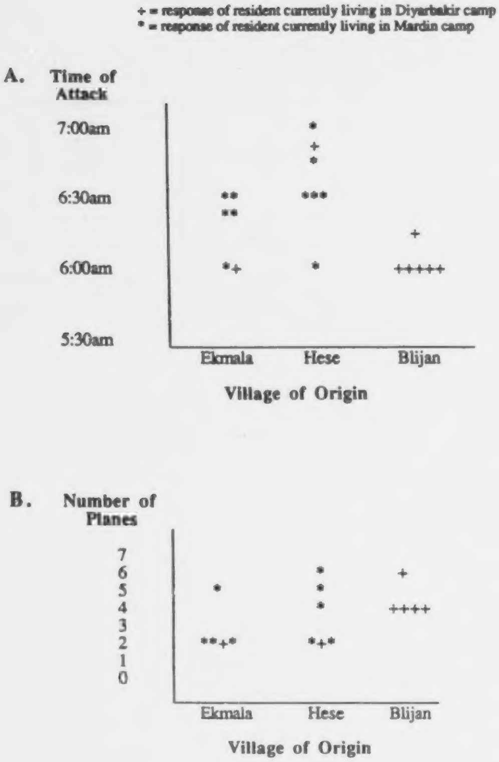
reliable									unreliable
1	2	3	4	5	6	7	8	9	10

APPENDIX C: FIGURE AND TABLES

FIGURE : Plots of Responses by Residents Living in Diyarbakir and Mardin Camps

TABLE 1: Personal Characteristics and Village
TABLE 2: Conditions and Timing of Attack
TABLE 3: Attack Characteristics
TABLE 4: Proximity to Explosions and Casualties
TABLE 5: Symptoms
TABLE 6: Respondents' Home Villages in Northern Iraq
TABLE 7: Ages of Respondents
TABLE 8: Characteristics of Agents
TABLE 9: Percent of Respondents Reporting a Symptom
TABLE 10: Ten Most Frequently Reported Symptoms
TABLE 11: Estimated Distance from Nearest Bomb-Burst
TABLE 12: Association between Distance from Bomb-Burst and Severity of Symptoms

FIGURE


+ = response of resident currently living in Diyarbakir camp
* = response of resident currently living in Mardin camp
A.
Time of Attack
7:00am
6:30am
6:00am
5:30am
Ekmala
Hese
Blijan
Village of Origin
B.
Number of Planes
7
6
5
4
3
2
1
0
Ekmala
Hese
Blijan
Village of Origin

(Figure, cont'd)

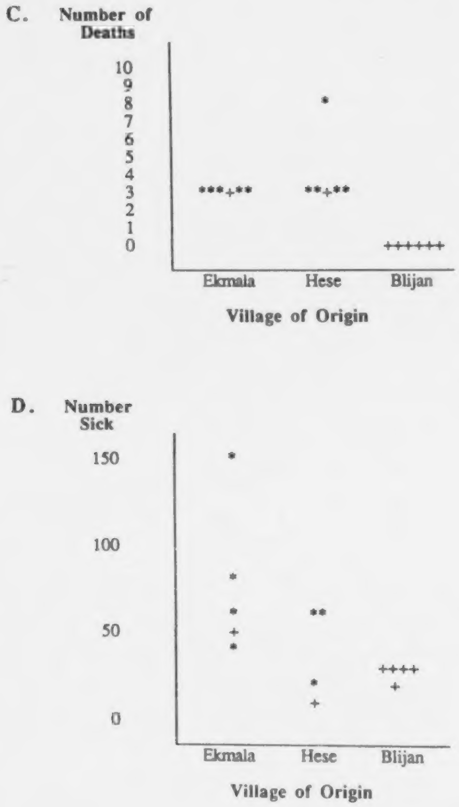


TABLE 1: Personal Characteristics and Village

Name
Age
Sex
Previous state of health
Refugee camp
Home village
Usual population of village

TABLE 2: Conditions and Timing of Attack

Date
Time of day
Location of detonations
Weather and wind conditions
Population of village at time of attack

TABLE 3: Attack Characteristics

- Weapon used:
  - aircraft bomb
  - aircraft spray
  - rocket
  - artillery
  - mortar
  - other
  - uncertain
- If aircraft, what type:
  - helicopter
  - jet
  - propeller-driven
  - other
  - uncertain
- If aircraft, number involved in attack
- Number of attacks
- Location of explosions
- Production of clouds
  - cloud color
  - cloud odor

TABLE 4: Proximity to Explosions and Casualties

Estimated distance to nearest explosion
Estimated number of deaths personally observed in village
Estimated number of injuries in village
Effect on nearby animals

TABLE 5: Symptoms

- EYES
  - pain
  - redness
  - swelling of eyelids
  - double vision
  - tearing
  - discoloration of whites of eyes
  - burning sensation
  - temporary blindness
  - loss of visual acuity
  - avoidance of bright light (photophobia)
- UPPER RESPIRATORY TRACT
  - dry throat or mouth
  - taste in mouth
  - sore throat
  - burning throat
  - hoarseness
  - tightness of throat
  - nose itching
  - nose burning
  - dry nose
  - nosebleed
  - nasal secretions/discharge
  - mouth ulcers
  - mouth blisters
  - bleeding from mouth
  - swollen tongue
  - increased salivation
- LOWER RESPIRATORY TRACT
  - difficulty breathing
  - chest tightness
  - wheezing
  - chest pain
  - chest burning
  - choking feeling
  - dry cough
  - cough with sputum
  - cough with blood (hemoptysis)
- EARS
  - pain
  - blisters
  - hearing loss
- MUSCULOSKELETAL
  - stiff neck
  - neck swelling
  - joint swelling
  - joint pain
- SKIN
  - itching
  - burning sensation
  - blistering
  - discoloration
- NERVOUS SYSTEM
  - muscle tremors
  - generalized tension
  - loss of appetite
  - dizziness
  - headache
  - loss of consciousness
  - difficulty walking
  - disorientation
  - convulsions
  - drowsiness
  - insomnia
- GASTROINTESTINAL TRACT
  - abdominal pain
  - abdominal swelling
  - nausea
  - vomiting
  - blood in vomit
  - diarrhea
  - rectal bleeding
- URINARY TRACT
  - painful urination
  - bloody urine
- GENERAL
  - fever
  - sweating

TABLE 6: Respondents' Home Villages in Northern Iraq

Village	Number responding
Blijan	6
Ekmala	6
Hese	7
Korka	1
Berzewrick	1
Birjini	1
Warmyl	1
Tika	1
Kharab	2
TOTAL	26

TABLE 7: Ages of Respondents

Age group	Number
6-17	4
18-59	18
60-70	4
Total	26

TABLE 8: Characteristics of Agents

COLOR

Description	Number	Percent
dark yellow	14	54%
pale yellow	8	31%
bluish	1	4%
unable to say	3	12%

ODOR

Description	Number	Percent
"rotten garlic"	8	31%
"bitter"	6	23%
"dead bodies"	3	12%
"cooking gas"	2	8%
"DDT"	2	8%
unable to say	6	23%

TABLE 9: Percent of Respondents Reporting a Symptom

eye pain	73
eye redness	89
eyelid swelling	54
double vision	31
tearing	62
temporary blindness	54
dry throat	58
dry nose	15
nose bleed	31
increased nasal secretions	66
ear pain	15
hearing loss	11
neck stiffness	31
throat burning	73
swollen lips	54
mouth blisters	54
swollen tongue	27
increased salivation	8
shortness of breath	85
wheezing	54
chest pain	69
chest burning	65
cough	65
neck swelling	8
itchy skin	12
skin burning	27
blistering	46
skin discoloration	39
joint swelling	0
joint pain	12
tremor	54
appetite loss	58
sputum production	19
hemoptysis	8
abdominal pain	50
nausea	69
vomiting	69
diarrhea	35
bloody diarrhea	12
dysuria	39
dizziness	73
loss of consciousness	42
seizures	0
drowsiness	15
insomnia	35
visual disturbance	31
weakness	0
fever	35
sweating	65

TABLE 10: Ten Most Frequently Reported Symptoms

Symptom	Percent reporting
Redness of eyes	89
Shortness of breath	85
Throat burning	73
Eye pain	73
Dizziness	73
Chest pain	69
Nausea	69
Vomiting	69
Headache	69
Increased nasal secretions	66

TABLE 11: Estimated Distance from Nearest Bomb-Burst

Estimated Distance from Nearest Bomb-Burst	Number
Less than 250 meters	8
251 to 500 meters	9
More than 500 meters	5

TABLE 12: Association between Distance from Bomb-Burst and Severity of Symptoms

	SEVERITY		
Distance from Closest Bomb	High	Low	Total
Less than 250 meters	4	4	8
251 to 500 meters	4	5	9
More than 500 meters	0	5	5
TOTAL	8	14	22

APPENDIX D: SUMMARY OF UN DOCUMENTS ON USE OF CHEMICAL WEAPONS IN THE IRAN-IRAQ CONFLICT

The General Secretary of the United Nations has repeatedly called for nations to abide by the Geneva Protocol of 1925 and other international agreements. The UN has now sent seven missions to investigate allegations of chemical weapons use in the Iran-Iraq conflict, and the Secretary General requested a mission to northern Iraq in the wake of the events in late August, but the governments of Turkey and Iraq refused permission for such an investigation.

UN staff and chemical weapons specialists from around the world have participated in the UN investigations, which resulted in a series of reports. A recent compilation of UN documents on chemical warfare in the Iran-Iraq war included 252 documents. The core documents are reports of the missions and related appendices. The first of the missions took place from 20 May to 2 June 1983 (S/15834). A second mission, 13-19 March 1984, reported finding unexploded munitions and exploded fragments. Analysis of samples taken by the second mission revealed sulfur mustard, and one unexploded munition contained the nerve gas Tabun (S/16433 and appendices, 26 March 1984).

In a report to the General Assembly, UN experts recognized several situations that might arise when attempting to investigate allegations that chemical weapons had been used. They noted the need for expert assessment, the importance of site access, and the value of medical records of alleged victims (A/39/488, 2 October 1984, pp. 22-28). This document prepared a framework for future investigations.

There were then five more missions to Iran and Iraq. A report of 12 March 1986 again noted evidence of sulfur mustard use (S/17911 with Add. 1 and 2, and Corr. 1). The report from 8 May 1987, reporting on trips to Iran and Iraq from April and May of that year, for the first time noted many civilian casualties. That report concluded that Iranian positions had been attacked by Iraqi forces with sulfur mustard and probably nerve agents, and that military and civilian personnel had been injured by mustard gas. Iraqi forces were also noted to have been affected by mustard gas and perhaps also by a pulmonary irritant (such as phosgene), but the mission team did not determine whether these were caused by Iranian or inadvertent Iraqi attacks (S/18852; see also its appendix S/18852/Add. 1, 18 May 1987). In this report, the technical experts first sounded a note of intense frustration that chemical weapons continued to be used despite thorough documentation of prior use. This same theme recurred in all subsequent reports. The April-May 1987 UN mission was the first investigation on Iraqi soil.

In April 1988, the UN mission again investigated allegations in both Iran and Iraq. In Iran, many of the victims were civilians, and the agent used was sulfur mustard and most likely a nerve agent as well. In Iraq, all those affected were military, and the report did not reach a conclusion on the origin of the attack causing the injuries (S/19823, 25 April 1988, and Add. 1, 10 May 1988).

Another UN report is based on an investigation in Iraq from 9-11 July 1988. The investigators concluded that nine Iraqi soldiers from regions near Sulaymaniyah and Basra were injured by mustard gas. The UN team was shown fragments and unexploded 81-mm. mortar shells that contained sulfur mustard, and other munitions claimed to have been captured from Iranian forces. The team did not reach a conclusion that the attacks causing the injuries had come from Iranian forces, however, and noted that the 81-mm. shells could be fired with 82-mm. mortars such as those used by Iraqi armed forces. The number of casualties and extent of injuries was significantly less than in previous UN investigations (S/20063, 25 July 1988 and Add. 1, 2 August 1988).

The most recent UN mission went to Iran from 12-14 August 1988. The report of that mission documented civilian injuries from mustard gas and found residues of sulfur mustard in soil samples. Munitions used in the attack were similar to those seen in 1984, 1986, 1987, and 1988. This corroborated eyewitness accounts, and the investigators concluded the injuries resulted from Iraqi air attack (S/20134, 19 August 1988).

APPENDIX E: CHRONOLOGY OF THE TRIP

10/6/88	Met in Physicians for Human Rights office in Somerville, Massachusetts, USA. Left Boston for Frankfurt.
10/7/88	Frankfurt to Ankara.
10/8/88	Ankara to Diyarbakir.
10/9/88	Enter *Gecici barinma merkesi, Kiziltepe/Mardin* (refugee camp near Mardin). Attempted to visit Diyarbakir camp, closed due to incident two nights before. Attempted to meet with Hayri Kozakcioglu, governor of the eastern Turkey region; planned meeting with his deputy for Monday (10/10) a.m.
10/10/88	Waited for meeting with deputy regional governor; given permission to enter Diyarbakir refugee camp; entered camp from 11:00 a.m. to 3:30 p.m. Returned to Diyarbakir city to meet with deputy governor, 5:00 to 6:30. Refused permission for further visits, unless directed by Ministry of Interior.
10/11/88	Traveled to Hakkari Province. Attempted to go on road to Yuksekova. Denied permission by military guards, who referred team to Hakkari governor.
10/12/88	Attempted to meet with Hakkari provincial governor at 8:30 a.m. Rescheduled to 1:30 p.m. At that meeting, he said he would like to let us see camps near Yuksekova but did not have authority without written permission (later changed to telephone or cable notification) from regional governor's office (Diyarbakir). Obtained permission to visit Hakkari Hospital. Went to Hakkari Hospital, entered emergency room, shown to director's office. Asked to tour hospital and speak with doctors. Director (not a physician) called regional governor's office to ask permission to do this. No reply to his call in 45 minutes. Had to leave for Diyarbakir to avoid difficulties of clearing road checkpoints at night. Returned to Diyarbakir.
10/13/88	Attempted to enter refugee camp near Silopi, Mardin Province. Met with Mardin provincial governor, who spoke with deputy regional governor (Diyarbakir), then denied permission to enter. Reason given was that for ten days refugees would be filling out forms designating where they wished to reside in the future. One team member returned to Ankara; other two attempted repeatedly (four times) to meet with regional governor or deputy governor in Diyarbakir. Report outlined.
10/14/88	Meetings with news services and diplomatic corps of several countries. Team reunited in Ankara.
10/15/88	Meetings with news services and members of parliament from southeastern Turkey region: one member of ruling Motherland Party, and four members of opposition Social Democratic Populist Party.
10/16/88	Ankara to United States.

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PHYSICIANS FOR HUMAN RIGHTS
AN ORGANIZATION OF HEALTH PROFESSIONALS

EXHIBIT NO. 16

SUPPLEMENTARY STATEMENT OF PHYSICIANS FOR HUMAN RIGHTS

BEFORE THE PERMANENT SUBCOMMITTEE ON INVESTIGATIONS
COMMITTEE ON GOVERNMENTAL AFFAIRS
U.S. SENATE

February 9, 1989

Physicians for Human Rights is a group of health professionals committed to bringing medical skills and influence to the prevention of human rights abuse throughout the world. We are concerned not only with the specific abuse of human rights that is represented by the use of poison gas, as our delegation found in its study of the attack on civilians in Iraqi Kurdistan, but also with the general issues of the prevention of the use of chemical and biological weapons throughout the world.

Chemical and biological weapons have the potential for immense destruction to human life and health and to the ecosystem on which our lives depend. Both types of weapons have characteristics that make them especially dangerous to human rights. These weapons are indiscriminate, affecting both combatants and non-combatants. For both types of weapons the consequences of exposure are far worse for the most vulnerable in the population--the very young, the very old, the sick and the poor.

Furthermore, the health consequences of the use of either chemical or biological weapons could easily overwhelm medical resources. Biological weapons have characteristics that may make them even more difficult to deal with medically than chemical weapons:

(1) In contrast to an attack by chemical weapons it may not even be clear immediately that an attack by biological weapons has taken place.

(2) The consequences of the use of biological weapons may have a more insidious onset, with initial effects appearing in a small part of the population and spreading to others over weeks to months.

(3) The consequences of the use of biological weapons may be less readily identifiable and may raise more difficult problems of diagnosis and treatment.

(4) The consequences of the use of biological weapons may include the induction of carrier states that spread disease far beyond the initial foci of attack.

We believe, however, there can be no truly effective medical

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response to many potential uses of either chemical or biological weapons. By analogy with other medical problems for which no effective response exists, this means that we as physicians have a special responsibility to help prevent these problems and therefore to work for the effective prevention of the use of these weapons.

Physicians for Human Rights believes that the only effective means of eliminating the use of chemical and biological weapons is a total international ban on their development, manufacture, deployment and use. Given the speed with which research, development and manufacturing operations can be altered or concealed, Physicians for Human Rights believes that the only effective monitoring system is one that provides for unlimited, unannounced inspections ~~with no~~ prior notice. This will require a corps of full-time, technically-qualified, internationally-certified inspectors, under UN or WHO auspices, in every nation signatory to the ban.

Since we know of no way to distinguish research and development for "defense" from research and development that are part of preparation for "offense" using chemical and biological weapons, we believe this ban must include research and development alleged to have as its purpose "defense" against these weapons. Furthermore, we believe such research and development is one of the factors driving a chemical and biological weapons arms race; any nation pursuing so-called defensive research and development will be suspected by other nations of developing offensive capabilities and at least some of these nations may well respond with research and development of their own.

Physicians for Human Rights recognizes that there are areas of research and development for the protection of human health, as well as the protection of entire ecosystems of fauna and flora, that may be construed as research and development directly related to chemical and biological weapons or the results of which might at some time in future be relevant to chemical and biological weapons. Examples include research and development on methods to protect workers in chemical industries or on methods to immunize people against infectious disease.

In order to implement the ban effectively we propose that it include research and development related to chemical and biological weapons that (1) is not fully "open" and (2) is not recognized internationally as "relevant" to the prevention, treatment or understanding of chemical or biological hazards that currently exist in nature. "Openness" requires the formation of accredited international teams with the right to inspect the sites of research and development at any time without notice and that the methods and results of the research and development be published or released to the professional and general public on a complete and regular basis. "Relevance" requires that a recognized international health agency (for example, the World Health Organization) establish a standing multinational committee to (1) establish a list of chemical and biological agents that pose current hazards in nature and on which research and development for prevention, treatment or understanding is needed and (2) review immediately proposals for additions to the list based on newly-discovered hazards or new ideas for understanding them (for example, discovery of new natural infectious agents or of the naturally-occurring pathogenicity of existing agents previously thought to be non-pathogenic).

These proposals may seem complex, ponderous and expensive. We recognize that the promotion of a detailed and comprehensive ban and the training and funding of a substantial international corps of inspectors will require a high degree of international cooperation and entail substantial costs. But just as prevention is almost always far more cost-effective that treatment, the costs of the efforts we propose are small in comparison with the costs--to human life, our environment, and the very concept of human rights--of the further development and use of the weapons of mass destruction.

Physicians for Human Rights is represented at these hearings by: Robert Mullen Cook-Deegan, M.D., a member of the delegation that studies the use of poison gas against civilians in Iraqi Kurdistan and the presenter of our primary testimony; Susannah Sirkin, Physicians for Human Rights Associate Director; and Victor W. Sidel, M.D., chair of the Physicians for Human Rights Working Group on Chemical and Biological Weapons and a past president of the American Public Health Association. Physicians for Human Rights is prepared to work with other committees and members of Congress to define the problems in banning chemical and biological weapons and in finding effective solutions to stop the proliferation of chemical and biological weapons.

EXHIBIT NO. 17

Chemical and Biological Weapons: New Technologies and the Prospect for Negotiations

Brad Roberts
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from a forthcoming publication of
The Woodrow Wilson International Center for Scholars
Strategy, Arms Control, and Technological Change (1989)

2/3/89

New technology is a relative concept in the field of chemical and biological warfare (CBW). Unlike nuclear weapons whose significance for conflict is measured in decades, biological weapons date back millennia and chemical weapons at least a century. The march of technological change over this time in the chemical and biological sciences has stimulated the episodic transformation of the implements of war. Those weapons have also been shaped by an ever-changing military and international political context.

The complex relationship between technology and arms control is also vividly demonstrated in the CBW field. Efforts to construct an arms control regime date back nearly 100 years. The widespread chemical warfare of World War I gave rise to the relatively stable but fragile arms control regime embodied in the 1925 Geneva Protocol. Efforts to update and expand this regime are ongoing as are efforts to explore and adapt modern chemical and biological sciences to military purposes.

By drawing on this experience, we can begin to formulate some tentative insights into the basic relationships among changing weapons technology, arms control, and national security. Can international agreements prevent destabilizing technological changes? Or must arms control measures inevitably be swept aside by technological change? Is security enhanced by changing technology? How closely should we equate an imperfect arms control regime with national security? Will specific technological changes predicted in the area of CBW contribute to enhanced international stability or are we headed toward a world in which chemical and biological weapons proliferate and are used more frequently?

The Chemistry of War - The Technical Dimension

Both chemical and biological weapons cause damage to living organisms through physiological effects rather than through direct physical impact from blast or heat. Both affect primarily living organisms (i.e., they are biospecific) and do little damage to physical structures. But chemical weapons are not biological weapons and the differences between the two are essential to the discussion that follows. Chemical agents of warfare are chemical substances, whether gaseous, liquid, or solid, which might be employed because of their direct toxic effect. Biological agents of warfare are living organisms, or infective material derived from them, which are intended to cause disease or death and which depend for their effect on their ability to multiply in the organism attacked. Toxins are chemical substances produced by living organisms but not themselves living.[1]

Chemical agents are generally categorized as either incapacitating or lethal. Incapacitating agents temporarily impair the ability of a person to function effectively. These agents are divided into physiochemical and psychochemical types, the former causing severe irritation or paralysis and the latter causing mental disorientation. Lethal agents are divided into four types: blister agents (vesicants such as mustard gas), blood gases (that interfere with cell respiration), lung irritants (that injure respiratory tissues), and nerve agents (that impair the body's ability to regular muscle action, causing uncontrollable muscular activity which leads to death through respiratory failure).

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[1] For a more complete description, see Stockholm International Peace Research Institute (SIPRI), The Problem of Chemical and Biological Weapons, v. II. (Stockholm: 1973).

The first modern chemical weapons were used extensively in World War I. These were essentially industrial chemicals such as chlorine. The more lethal nerve agents were developed during the 1930s as a result of commercial work on insecticides. This first generation of nerve agents (called G agents) work primarily through inhalation. Included within this group are the agents Tabun (GA) and Sarin (GB). A second generation of nerve agents--V agents--were developed during the 1950s. Their effects occur primarily by absorption through the skin. A principle measure of differentiation among nerve agents is their relative persistence, which is a measure of the susceptibility of chemical agents to degradation owing to the effects of exposure to wind, sun, rain, and other climatological factors. Some retain their toxic effect for hours, others for days.

Since the development of V agents in the 1950s, there has been relatively little change in the science of agents of chemical warfare. There is, however, growing concern that a new generation of toxins (defined above as chemical agents derived from living material) may be a by-product of the biotechnology revolution, though this is a problem that has yet to come into sharp focus.

In the area of delivery systems as well, technological change has been modest. By the end of World War I, chemical agents were being delivered in artillery shells. This continues to be the principal mode of delivery. Spray tanks, bombs, land mines, mortars, and battlefield rockets containing chemical agents have also been developed. Some countries have explored missile technology for chemical warhead delivery including short- and long-range ballistic missiles as well as cruise missiles.

In the 1950s the United States began development of a safer but more complex chemical munition technology. This technology is designed to store separately two chemical precursors so that the nerve agent is not actually created until the weapon is in flight to its target. The resultant weapons are termed binary weapons (since the ingredients are in two parts); their predecessors are termed unitary weapons. Binary munitions disperse G or V agents and not, as some have alleged, a new and more toxic generation of nerve agent. The binary technology was refined during the 1960s and a binary artillery shell was put into production in late 1987 (with the cessation of the chemical weapons production moratorium by the United States that began in 1969). A binary bomb called Bigeye has experienced developmental problems but low scale production has been funded and is expected in 1990. A chemical munition for the Multiple Launch Rocket System (MLRS) is moving into full-scale development and production monies may be sought in Fiscal Year 1991. Roughly speaking, each of these systems is an updated version of chemical delivery systems previously stockpiled by the United States.

Changing Perceptions of Military Utility?

What is the place of chemical weaponry in modern armed conflict? How might changing technologies influence perceptions of the military utility of such weaponry? Answers to these questions depend very much on which nation's military is asking and in what circumstances. There is a great danger that our thinking about these questions is constrained by mirror-imaging, i.e., the tendency to attribute our assumptions and perceptions to others.

Concerning the perspective of chemical warfare specialists in the armed forces of the United States, the most that can be said is that chemical weapons have an uncertain military value except in very limited circumstances. Based on its reading of World War I and subsequent technological developments, the U.S. military has concluded that chemical weapons are unpredictable on the battlefield, cumbersome to use, and disruptive of one's own combat operations. The disadvantages of chemical warfare are particularly evident in a NATO-Warsaw Pact conflict in central Europe, where chemical weapons stand out as ill-suited to the defensive character of NATO strategy and as likely to inflict large numbers of civilian casualties. The disadvantages of chemical warfare may be less evident in military theaters outside Europe, though the attention of the U.S. military to such contingencies is generally quite low.

To the extent that the U.S. military sees any utility in chemical munitions it is in imposing the burdens of chemical use on the initiator of chemical warfare. Their utility derives, then, not from their direct toxic effect but from the cumbersome defensive measures that must be taken by a military force expecting to fight in a chemically contaminated environment. In short, the U.S. military sees the principal purpose of a chemical arsenal as deterrent rather than war-fighting. It sees the maintenance of a chemical deterrent as well-suited to NATO's flexible response strategy and the panoply of deterrence and escalatory forces it envisions in time of conflict in Europe. Some Europeans, however, question the role of a CW capability in Western deterrence, arguing that it diminishes the certainty of nuclear escalation by the United States in favor of measures limiting the war to Europe.

The efficacy of this deterrent effect is supported by historical experience since World War I--no nation possessing a chemical arsenal has been attacked with chemical weapons since that time. But the lessons of history are not always as clear or permanent as some would wish. The history of chemical deterrence is instructive but only if read somewhat guardedly--the future may look quite different.[2]

Consonant with this reading of the military utility of chemical weapons, the United States possesses a stockpile of chemical weapons under a doctrine of no-first-use as well as relatively robust chemical defensive capabilities. The United States defines the size of its stockpile as "modest." During the 1950s and 1960s the United States built a stockpile of munitions deemed sufficiently large and diverse to meet perceived military needs. It ceased production in 1969. The binary production program begun in late 1987 is intended to replace the existing stockpile with one smaller in size but more militarily potent.

The credibility of this deterrent strategy is a subject of debate. A formal NATO chemical strategy does not in fact exist. It is an assumption about how things might work under flexible response. NATO command has no chemical weapons at its direct disposal and no agreed doctrine for their use. Furthermore, nearly half of NATO's members have not reserved for themselves under the Geneva Protocol the right to use chemical weapons in retaliation (Denmark, Greece, Iceland, Italy, Luxembourg, Norway, and Turkey). Former Supreme Allied Commander, Europe, General Bernard Rogers has repeatedly and vocally urged the alliance to focus on the question of its response in the event of chemical attack.

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[2] For an historical analysis of chemical deterrence, see Frederic J. Brown, Chemical Warfare: A Study in Restraints (Greenwood Press, Westport, 1968), and John Ellis van Courtland Moon, "Chemical Weapons and Deterrence: The World War II Experience", International Security, 8:4 (Spring 1984), 3-35.

To what extent has technological change affected U.S. perceptions of the military utility of chemical weapons or changed operational concepts? Probably not very significantly.

Binary technology does diminish some of the constraints on U.S. chemical warfare options--binary munitions are safer to build, store, and transport. But binary munitions are still not easily assimilated into U.S. military practice or easily used in time of war. Furthermore, the delivery system technology has not changed the central problems of battlefield unpredictability. The decision to produce binary weapons was not made simply because a more advanced technology became available; rather renewed production came to be perceived as necessary for the maintenance of deterrence and as a useful bargaining chip in the disarmament negotiations.[3]

But this is not to argue that U.S. chemical weapons production is not without implications in terms of a possible future rethinking of the operational framework. One implication relates to the growing ability--and compulsion--to strike deep in a European war. A NATO ability to project chemical warfare into Eastern Europe and the Soviet Union would mean a widening of chemical conflict beyond the forward edge of the battle. Some analysts distinguish between a "defensive chemical deterrent" and an "offensive chemical deterrent" and argue that the United

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[3] "Report of the Chemical Warfare Review Commission," U.S. Government Printing Office, June 1985. See particularly Part II.

States is moving in the direction of the latter with its longer-range delivery systems, i.e., the Bigeye bomb and MLRS. If limited chemical retaliation does not deprive the initial attack of its advantages and chemical war becomes widespread, the deterrent function of Western chemical munitions will have disappeared. Worse yet, the massively destructive effects of chemical warfare will spread through civilian populations across Europe--with horrendous and immediate effect.

A second implication stems from the plan to arm the navy with chemical munitions. The deterrent function of U.S. chemical weapons is not particularly convincing in Third World contingencies not involving a direct conflict between the United States and the Soviet Union or their allies. For example, were U.S. naval ships in the Persian Gulf to be attacked with chemical weapons, U.S. chemical retaliation intended to force attacking military forces into chemical protective gear could hardly be seen to deter further attack. Instead, U.S. escalation dominance in terms of its overall conventional capabilities and credible ship-board chemical defenses would seem to be more essential to chemical deterrence. Furthermore, the dispersal of chemical munitions aboard U.S. naval ships risks stimulating the problem of chemical proliferation, invites a further politicization of the issues of overseas basing and port access, and offers little clear advantage in chemical deterrence.

Soviet perceptions of the military utility of chemical weapons may well differ from those of the United States. There is an extensive debate within the Western policy community about both Soviet chemical warfighting capabilities and Soviet intent. This debate has obscured the wide areas of agreement on the subject among analysts.

There is a relatively high degree of consensus about Soviet chemical warfighting capabilities. Defensively, the USSR has a formidable (though not invincible) ability to operate on a contaminated battlefield. Offensively, it possesses a variety of agents and delivery systems in sufficient quantities for extended use (although exact numbers are unclear) and with the ability to do so. Little is known about Soviet research and development in the chemical area, though there is some worrisome speculation about research on defense-defeating agents and such other developments as effective self-antidotes.

There is more disagreement and less knowledge about Soviet intentions vis-a-vis this capability. It is likely that the way in which the Soviets contemplate chemical weapons use fluctuates along with their perceptions of changes in the battlefield environment, relevant technologies, Western capabilities, the nuclear balance, and a variety of other matters. It is therefore dangerous to impose Western views about the utility of chemical weapons onto the Soviets. At times chemical weapons probably have played a major role in Soviet conceptions of a non-nuclear war in Europe. Growing Soviet nuclear capabilities may have diminished the importance of chemical weapons. Their importance has not been eliminated, however, and may well have grown with regard to long-range selective use.[4]

Two scenarios stand out as relevant to thinking about the Soviet/Warsaw Pact use of chemical weapons. The first is the not-unreasonable scenario depicted in Tom Clancy's novel Red Storm Rising--Soviet strategic deception at the outset of conflict in Europe in order to prolong the impression that Soviet military action is defensive, morally justified by Western provocation, and deserving of international support. Soviet chemical first-use would contrast with the essential image and therefore would be unlikely. On the other hand, chemical war might also start through an act of chemical deception; the Iraqis are alleged to have faked (and indeed perhaps to have inflicted) chemical attack on their troops so as to justify their own use of chemical weapons.

The second scenario is closer to conventional wisdom--a Soviet blitzkrieg against NATO paced by the need to prevent NATO nuclear response and to create a fait accompli before NATO has mobilized a conventional response. In this scenario, chemical weapons could have an early and decisive effect. Studies have shown the ways in which Soviet chemical use could contribute to this goal.[5] Soviet chemical attack would likely focus on static targets in NATO's rear. Non-persistent agents would be applied to areas to be occupied by Warsaw Pact forces; persistent agents would be used to deny staging and transport areas to NATO, to interdict the movements of goods and manpower, and to disrupt command, control, and communications, especially of nuclear assets.

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[4] For a discussion of the place of chemical weapons in Soviet military doctrine see Enrico Jacchia, ed., Chemical Warfare in Soviet Military Doctrine, (Rome: Centro di Studi Strategici, 1985). See also C.N. Donnelly, Heirs of Clausewitz: Change and Continuity in the Soviet War Machine, (London: Institute for European Defence & Strategic Studies, 1985), Occasional Paper, No. 16.

It is thus the overall disruptive effect of chemical attack in terms of the reduced efficiency of NATO forces operating in a defensive posture, especially in one-sided chemical warfare, that is the principal measure of the military efficacy of Soviet chemical weapons. For example, Soviet chemical attack on Western airbases could help them contend with two of NATO's great strengths--air superiority and air delivered nuclear assets--since the NATO sortie rate would drop at least 80 percent (SACEUR's calculation). It could slow mobilization, help bring about the political collapse of NATO, and preempt the use of nuclear weapons. Chemical attack would also panic Western publics, sparing the Warsaw Pact the task of fighting through densely populated urban areas and contributing to confusion in the NATO rear.

In sum, Soviet/Warsaw Pact chemical first-use could be well-suited to current operational concepts as we understand them: the use of surprise, the control of tempo and initiative, flexibility along an amorphous front, and preservation of Western infrastructure.

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[5] Chemical Warfare Study: Summary Report (Alexandria, Va.: Institute for Defense Analyses Paper P 1820, February 1985).

Obviously, Soviet operational concepts are subject to change, particularly in the dynamic Gorbachev era. The Pentagon has indicated some shifts in Soviet thinking about the role of chemical weapons in European conflict. The long-standing assumption that a surprise Soviet attack would begin with massed chemical attack has given way to an expectation that chemical use would be more selective and limited. But a recent Presidential Chemical Warfare Review Commission pointed out that this is not cause for relief:

> "That change to a more modern doctrine is not encouraging, however. It represents a Soviet conclusion that its attacking forces would be best served by limiting chemical use to key areas, so that they can fight unencumbered elsewhere. More importantly, it suggests that Soviet chemical attacks are planned to be sufficiently discrete in area and target that Western political authorities, unless they had sufficient chemical retaliatory capability, would be likely to hesitate before turning to nuclear arms as a response. As officials of one European government pointed out to the Commission, the new doctrine makes Soviet use of chemical weapons more, rather than less, likely."[6]

The Soviet first-use of chemical weapons is by no means certain, even if this reading of their operational concepts is largely correct. Disincentives remain. One is the escalatory potential of chemical use. The NATO threat to escalate under flexible response may have lost some of its credibility since the late 1960s, but enough doubt must remain to create uncertainty in the minds of Soviet political leaders that if Soviet chemical weapons are used to decisive effect a Western nuclear response may be possible. A second constraint is simply the complexity of chemical warfare. If the Soviets are compelled to move quickly in a surprise blitzkrieg and to maintain a rapid tempo, the logistical and operational burdens of chemical usage could add a layer of complexity out of proportion to the military benefit and risk. This observation is especially true if the Soviets anticipate chemical retaliation.

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[6] "Report of the Chemical Warfare Review Commission," 28.

The INF treaty and the force reductions it obliges are likely to influence Soviet thinking about chemical warfare in Europe. No one has disputed that in the wake of the INF reductions the USSR will retain sufficient numbers of launchers to ensure the kind of target coverage of NATO assets that it desires. The question now is how to allocate what kinds of warheads over a smaller number of launchers. The Soviets will have to make a choice about the importance of chemical warheads in the warhead mix.

An assessment with mirror-images of U.S. and Soviet perceptions would stop here. But some have argued that Soviet thinking has carried the military utility of chemical weapons into other forms of conflict.[7] It is generally accepted that Soviet doctrine calls for the extensive use of covert operations by spetsnaz (special operations) forces to disrupt Western military decision-making assets and to preempt Western action. By and large, these assets are quite vulnerable to chemical attack by special forces.

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[7] Joseph D. Douglass, Jr., and Neil C. Livingstone, America the Vulnerable: The Threat of Chemical and Biological Warfare, (Lexington, Ma.: Lexington Books, 1987).

In sum, to the extent that we can say with confidence anything about Soviet perceptions of the military utility of chemical weapons, it is that those perceptions are not driven so much by changing technology as by a careful reading of operational imperatives and military history. Since those differ from those of the West, it is not surprising that the perceptions of military utility may differ as well.

In the late 1980s a discussion of the military role of chemical weapons cannot stop with the superpowers. Chemical weapons have a growing appeal in the Third World. At the beginning of this decade, conventional wisdom had it that only three to five countries possessed chemical weapons. Today, estimates range from 15 to 30 countries that either possess or are actively working to possess a chemical arsenal.[8] In September 1988, a Pentagon official pegged the number at 22.[9] Clearly, many of our concepts of military utility derive from a Eurocentric, modern armored force perspective, likely to be of little or no relevance to the perspectives of others. What accounts for the growing appeal of chemical weapons in the Third

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[8] Lois R. Ember, "Worldwide Spread of Chemical Arms Receiving Increased Attention," in Chemical & Engineering News, April 14, 1986, 8-16.

[9] Information supplied by Thomas Welch, Deputy Assistant Secretary of Defense (Chemical Matters), on September 12, 1988.

World?

First, chemical weapons can assume a more nearly strategic role (as opposed to a tactical one) in the Third World. The use of chemical weapons against an undefended opponent could turn the tide of a conflict, whether defensively, in terms of preventing an opponent from massing armies, or offensively, in terms of threatening a small country's political, economic, cultural, and historical identity centered in one urban center. This kind of scenario has earned chemical weapons the title of the "poor man's nuclear bomb."

Second, the construction of chemical arsenals might serve as a half-way house for those Third World states seeking a nuclear capability. The existence of a chemical arsenal might "legitimize" the deployment of delivery, C^3I (command, control, communications, and intelligence), and defensive systems upon which a subsequent nuclear capability might easily be grafted.

Third, many of the constraints on military utility that operate on the modern European battlefield may not be relevant in the Third World. Battlefield unpredictability, for example, may be less important where armed forces or neighboring populations may not be so highly concentrated geographically. In addition, little or no defensive gear would be available. Furthermore, chemical weapons might be perceived by some to have a special utility in counterinsurgency warfare.

The potential import of chemical weapons in military conflicts in the developing world has been demonstrated by the

Iran-Iraq war. Two United Nations investigations have confirmed the use of chemical weapons in that war. Iraq was long seen to be the guilty party, and in early 1988 admitted the use of such weapons. The United States maintains that there has also been some evidence of limited use by Iran. The experience is relevant for three reasons. First, the use of chemical weapons by Iraq appears to have been critical to the successful prosecution of its military strategy, a matter that is likely to incite chemical weapons proliferation. Second, the weapons used in the conflict appear to have been produced domestically, underscoring the ease of access of Third World militaries to this type of capability. Third, international public opinion and the pious outcry of government spokesmen appear to have been of little consequence to Iraqi decision-makers, thus eroding a key component of the existing arms control regime--i.e., the political costs of chemical use.

To what extent have Third World perceptions of the military utility of chemical weapons been shaped by technological change? The chemical proliferation problem is only tangentially a problem of technological change per se; rather, it is the increasing internationalization of the chemical industry, and the trade in goods and expertise that go along with it, that has put chemical arsenals within the reach of militaries outside of the East-West context. It is more a question of technological availability than technological change.[10]

The Chemical Arms Control Regime

An international legal regime for the control of chemical weapons is partially in place. International efforts to create legal restraints on the use of such weapons date back to the Hague conferences of 1899 and 1907, which proscribed the use of chemical weapons in war. Other components of the arms control regime include a number of peace treaties after the two world wars which forbade the losers of those wars from having chemical weapons. Additionally, the United Nations has passed a resolution which requires of all states that they look upon these components of the law as constituting a customary international law.

The cornerstone of the regime is the Geneva Protocol of 1925, to which more than 115 states are now bound. The states negotiating the protocol in the 1920s did not believe that it was possible to negotiate effective compliance and verification measures, so the convention permits states to produce and stockpile chemical weapons.[11] The agreement emerged simply as an undertaking not to use those weapons, and about half of the states who have acceded to its terms have done so under the condition that they retain the right to use chemical weapons if others use them first.

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[10] Binary Weapons: Implications of the U.S. Chemical Stockpile Modernization Program for Chemical Weapons Proliferation, Subcommittee on International Security and Scientific Affairs of the Committee on Foreign Affairs, April 24, 1984; 98th Cong., 2d sess.

[11] For an authoritative analysis of the use of chemical weapons in World War I and their aftermath, see L.F. Haber, The Poisonous Cloud: Chemical Warfare in the First World War, (Oxford: Clarendon Press, 1986).

These agreements are important components of international processes that have worked to hinder the spread and use of chemical weapons for decades. But the system as a whole is hardly rigorous; it is neither comprehensive, universally subscribed to, nor adequately verifiable.

To the extent that this legal regime has had much weight, it has depended largely on three intangibles. The first is the political cost that would be borne by states which break with its terms. These political costs would be high for many states, but we are learning that they are not so high for others. This group would include those states or regimes struggling for their survival as well as those whose relations with the major international actors are enmeshed in a complex web of interests. For example, compelling international opprobrium could not be brought to bear on Iraq after its use of chemical weapons because of the complicated U.S. history in the region, uncertain Western interests in the oil trade, complex Mideast politics, and the place of the Iran-Iraq conflict in East-West relations.

The second intangible is morality. The Western abhorrence of chemical weapons is firmly rooted in the experience of World War I. Those who did not share in that experience may not share

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the moral compunction not to use chemical weapons to the same degree. In wars like that between Iran and Iraq, where human wave attacks across mine fields are reportedly led by "expendable" young children, it is difficult to see how Western moral sensibilities might be of any relevance.

The third intangible is the confidence, however marginal, that the arms-control process has inspired in the minds of military planners that the momentum of events is carrying us toward the effective elimination of such weapons rather than their broader proliferation, thus reassuring those planners that their competitors do not contemplate using such weapons.

Ongoing negotiations at the U.N.-affiliated Conference on Disarmament in Geneva are aimed at creating a chemical weapons convention (CWC) that would provide a comprehensive and verifiable global chemical disarmament agreement. These efforts have been supplemented sporadically over the last 15 years by bilateral meetings between the United States and the Soviet Union. Two events mark the current phase of this effort.

The first event was the April 1984 submission by then-Vice President George Bush of a draft treaty. This submission broke a long lull in U.S. activism and helped recapture for the United States a degree of credibility on the issue. That credibility has not always been high. It was tarnished by the 50 years the United States took to accede to the Geneva Protocol, by the U.S. use of chemical defoliants in Vietnam, and, more recently, by the Reagan administration's strong commitment to renewed chemical weapons production and its general downplaying of the arms control agenda.

The second event marking the new phase was the emergence of Mikhail Gorbachev, which prompted a dramatic shift in Soviet negotiating style and substance. Gorbachev has articulated a high degree of interest in chemical arms control and has raised expectations considerably. Under his leadership, the Soviet negotiating team has moved in the direction of nearly every Western negotiating position, including particularly significant moves on verification.

The obstacles to an effective arms control regime are numerous. For example, the purpose of a CWC will be both disarmament and arms control--ensuring both that existing weapons are eliminated and that no new weapons are produced secretly. Furthermore, a CWC will have to be multilateral, even global. Verification of compliance with an agreement is both essential and profoundly difficult. Chemical weapons can be produced easily in small, seemingly innocuous facilities. Provision must be made for on-site inspections by trained experts; a measure of surprise is essential to deter those who cheat. The verification problem is especially acute in the developing world, where militarily significant cheating could occur at levels far below what would discomfit a superpower. These formidable conceptual and legal obstacles suggest a level of detail and breadth of scope unlike anything we have seen heretofore in arms control.

Technological change per se should not be an obstacle in the negotiating process. Detailed procedures have been elaborated that will permit and guide an international inspectorate in keeping abreast of changes in the chemical sciences and the emergence of new toxic substances with military applications.

The challenge provisions proposed by the United States and now largely endorsed by the Soviet Union are a radical solution to the compliance problem--mandatory international on-site inspections within 24 hours of request, any time and any place. The United States must now decide whether it can live with the intrusive measures it proposed for effective disarmament.

What are the prospects for the successful completion of a chemical weapons convention? A strong case can be made by the optimist. The effective reengagement of the superpowers in recent years has given a strong fillip to the arms control process. Movement in Soviet positions has created the framework for further progress. Expert working groups have fleshed out many of the details of a treaty. The principal actors face an array of political and military incentives--particularly the threat of chemical proliferation--compelling some form of agreement.

But the pessimists' case seems to be stronger for now. Even with Soviet acceptance of the U.S. position on verification, the verification problem has not been solved. Certain kinds of cheating will prove undetectable, however rapid or intrusive the inspection. Ironically, the United States and the Soviet Union may be able to agree on a verification regime that reassures that neither is engaged in militarily significant cheating; but in the developing world, surreptitious chemical weapons production and storage would be militarily significant at a much lower scale. This increases the likelihood that a chemical weapons convention may fall short of being truly global and comprehensive. A partial agreement that fails to disarm unstable areas of strategic importance, such as the Middle East, exposing U.S. forces and friends to chemical attack is less clearly in the interest of the United States--or the Soviet Union.

Given this global imperative, an effective agreement cannot be put together solely by the United States and the Soviet Union, however good their will, even working within the multilateral framework of the Conference on Disarmament. The onus is now on those other states possessing or seeking to possess chemical weapons. The United States and the Soviet Union could make it a common cause to tie formally their joint disarmament steps in the chemical weapons area to the actions of those states, perhaps with a joint, staged build-down agreement that ties the final stage of disarmament to steps taken in the developing world.

Recognizing the real obstacles to prompt and effective global disarmament, some analysts have proposed the application of regional interim solutions in the form of chemical weapons free zones. The elements of a European zone have been detailed and a modest amount of non-governmental dialogue has gone on in Europe since the idea was first put forth by the Palme Commission on Common Security in 1982. The essence of the proposal is the withdrawal behind the Urals of the Soviet chemical arsenal and across the Atlantic of U.S. munitions currently stockpiled in the Federal Republic of Germany (the latter will occur in any event by 1994). Whether such a zone is conducive to Western security is a subject of intense, if episodic debate.[12]

Technological Change and Chemical Disarmament

What does the foregoing analysis suggest in the way of conclusions about the relationship between technological change and the arms control process and prospects?

There is probably a connection between binary weapons production and arms control, but the precise character of that connection is difficult to gauge. Some have justified renewed chemical weapons production by the United States as reinforcing the arms control goal because it increases the incentives of the Soviet Union to get serious about arms control and the U.S. military capability. Others criticize production as the deathknell of the arms control process by signaling either a weakening of U.S. commitment to the disarmament goal or a reevaluation of the military utility of chemical weapons that will stimulate chemical weapons proliferation. Both arguments are credible; neither is persuasive.

A third argument runs as follows: even if renewed production is bad public diplomacy, it does not necessarily follow that it is bad for arms control. Arms control is an instrument of security, not its measure. Confusing the promise of arms control with its existence should be resisted. Actual disarmament will take a full 10 years from the time a CWC enters into force, in itself a number of years away by even the most wishful thinking. A nation feeling threatened by the chemical arsenal of a potential opponent might credibly choose to assure its interim security by producing a chemical arsenal for deterrence purposes without compromising its commitment to the disarmament goal (the INF analogy). France, for example, recently announced its intention to build such a stockpile.

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[12] Ralf Trapp, ed., Chemical Weapon Free Zones?, SIPRI Chemical and Biological Warfare Studies, no. 7 (Oxford University Press, Oxford and London, 1987).

Two further points must be made regarding the relationship between technological change and arms control. The first relates to the technology of verification. Regrettably, there is no technological fix to the verification problem--at least nothing in the short- to medium-term. The use of robotics and artificial intelligence may hold some long-term promise for ensuring the non-production of certain chemical agents in declared facilities, but that technology is not now available and in any case does not address the more complicated verification problem of non-production in undeclared facilities.

Second, the proliferation of chemical weapons made possible by the broader access to chemical goods and expertise is linked to the broader use of chemical weapons. The problem is not just the proliferation of chemical weapons, but their dispersal to states with revanchist ambitions led by men such as Muammar al-

Qaddafi, Hafiz al-Asad, and the Ayatollah Khomeini little attached to Western moral standards. This trend seriously undermines arms control prospects.

The Biology of War

Turning to biological weapons, one moves to less familiar ground and more difficult problems. With the successful conclusion of a Biological and Toxin Weapons Convention (BWC) in 1972, a global disarmament regime has been put in place in the area of biological weapons. What few arsenals of biological weapons that had been built in the years following World War II were presumably destroyed (in the case of the United States, the biological stockpile was unilaterally destroyed before the agreement was negotiated); further production of weapons was forbidden as was research for offensive purposes. The question of changing technology is central to understanding the future durability of the BWC.

Biological agents of war are living organisms such as bacteria, fungi, and viruses that kill by spreading disease. Such weapons have a long history in human warfare: in the 14th century, for example, the Tatar army defeated the besieged Crimean town of Kaffa by catapulting in corpses dead from the plague.[13] Though many living organisms are highly lethal to humans, biological weapons have not emerged as widely used instruments of modern war. The biological sciences so far have not proven well-suited to the dictates of modern warfare.

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[13] Newtol Press, "Haber's Choice, Hobson's Choice, and Biological Warfare," Perspectives in Biology and Medicine, 29:1 (Autumn 1985), 94.

Biological agents of war have a number of significant drawbacks as weapons. They are dangerous (and expensive) to produce, stockpile, and transport. Troops cannot be safely trained in their use or effectively protected against them. But perhaps most significantly, their dispersal cannot be controlled precisely and their military effect is uncertain even among those infected. These factors have led many to conclude that biological weapons have no military utility and that this accounts for the ease of biological disarmament. But this is a misreading of history and of biological weapons. In fact, biological weapons have potent utility but only in a very narrow range of circumstances--as strategic weapons in total war, as non-traditional weapons against political, industrial, agricultural, or social infrastructures, and as weapons of terror or blackmail in the hands of non-state actors. The United States and Soviet Union were able to agree on biological disarmament in the early 1970's because they possessed arsenals of strategic weapons similar in effect but different in mechanism to biological weapons (i.e., nuclear weapons) and because they wanted to nip in the bud any spread of biological weapons to others who might exploit their specific utility.

But unlike the area of chemical weapons, where the science and technology has changed relatively little since the 1950s, the biological sciences have undergone a revolution in the last two decades. The so-called biotechnology revolution has profound implications for our understanding of biological warfare. Its import stems from two factors. First, the newfound ability to manipulate and work with living organisms makes at least theoretically possible the production of biological agents or toxins that do not have the drawbacks for military purposes of traditional agents. Second, the revolution has precipitated much broader access to the kind of expertise and equipment necessary for biological warfare purposes, to the point today where nearly 100 countries are understood to have this level of capability.[14] However, it is difficult to gauge how assiduously the international military community has explored the biotech revolution for military purposes--and with what result.

The United States maintains a biological warfare research program consonant with provisions for research for defensive purposes under the BWC. This program has been described as follows:

> "Today the U.S. biological defense research program, administered by the army, focuses on developing vaccines against endemic diseases that U.S. troops are likely to encounter abroad...; against conventional BW agents...; against recently discovered pathogens...; and against exotic viruses....Military-sponsored research is also under way to understand how potent toxins work and to develop antidotes. Finally, the army is funding research and development on broad-spectrum antiviral drugs and ultrasensitive systems for rapidly detecting and diagnosing biological and toxin agents in the field. Since 1982, U.S. Army scientists have made increasing use of gene-splicing to study and

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[14] Testimony of Thomas Welch, Deputy Assistant Secretary of Defense (Chemical Matters), as reported in Defense Week, May 9, 1988.

> prepare defenses against extremely hazardous biological and toxin agents. Between 1980 and 1984, the number of Pentagon-funded projects using recombinant-DNA technology grew from zero to more than 40..."[15]

None of these research programs is classified (though some of the findings are) and all research is conducted in full compliance with recombinant DNA guidelines authored by the National Institutes of Health.

The United States intelligence community is disturbed by indications that the Soviet Union has maintained a biological warfare research program inconsistent with its commitments under the BWC. The level of Soviet activity is nearly impossible to gauge, especially for those not privy to intelligence information. Like much of the rest of the industrialized world, the Soviet Union has a high priority civilian program to explore the scientific and industrial potential of biotechnology. The Soviet military appears to be closely tied to that program, but with what result is unknown. The U.S. Defense Intelligence Agency has reported formally on Soviet biological warfare activities, concluding that

> "the size and scope of their [Soviet] efforts are not consistent with any reasonable standard of what could be justified on the basis of prophylactic, protective, or peaceful purposes....The Soviets are rapidly incorporating biotechnological developments into their offensive BW program to improve agent utility on the tactical battlefield."[16]

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[15] Jonathan B. Tucker, "Gene Wars", Foreign Policy, no. 57 (Winter 1984-85), 58-79.

[16] "Soviet Biological Warfare Threat", DST-1610F-057-86 (Washington, D.C.: Defense Intelligence Agency, 1986), 5.

There is growing concern about biological warfare-related activities in the Third World and among terrorist groups. Many of the factors cited above driving chemical proliferation have equal import in the biological area, particularly the growing access to materiel and expertise and the relative ease of producing militarily significant quantities of weapons of mass destruction. According to the U.S. Department of Defense, ten nations have developed or are actively working to develop an offensive biological weapons capability since the conclusion of the BWC in 1972.[17]

Perceptions of Military Utility

Since the biotechnology revolution is still underway, much of it behind closed doors overseas, we can only speculate about its near or long-term military and arms control implications.

Many dismiss the biotechnology revolution as largely irrelevant to biological warfare, arguing that even the most sophisticated new methods will not result in new agents more deadly than the already highly virulent naturally occurring agents. But the relative virulence of an agent is the narrowest possible measure of military utility. The changes in technology and expertise of the last two decades influence a whole set of technical parameters associated with the perceived military utility of biological agents and toxins.

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[17] Testimony of Thomas Welch, Deputy Assistant Secretary of Defense (Chemical Matters), as reported in Defense Week, May 9, 1988. Reportedly, most of these ten states are signatories to the Biological Weapons Convention; some are sponsors of acts of terrorism.

Clearly, the technical drawbacks to biological warfare have not been eliminated. But there is growing concern that those motivated to capitalize on the specific military benefits of biological warfare might today be able to undertake a program of research and production that would not have been as feasible two decades ago that actively minimizes the technical drawbacks to biological weapons. Militarily-significant quantities of biological agents can be produced more affordably and safely than in the past. They can also be produced more quickly, making possible the rapid breakout from a disarmed status. Gene-splicing technology makes it at least theoretically possible to produce a toxin with undetectable origin, giving great one-sided advantage to the side that knows how to produce the specific prophylactic innoculant. Some have suggested that it is possible to mask biological agents with other organisms so as to make the clandestine use of exotic agents untraceable (some allege that this is the connection between bee pollen and mycotoxins in Yellow Rain in Southeast Asia). Some have even claimed that it may ultimately be possible to design an "ethnic weapon" that selectively attacks humans of specific racial origin.[18] These changes have led one Defense Department official to conclude, "The prevailing judgment of years ago that BW is not a militarily significant weapon is now quite unsustainable. Biological weapons can be designed to be effective across the spectrum of combat...."[19]

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[18] Reports have circulated in recent years of attempts by the government of South Africa to design a biological agent that kills only blacks; such reports have been discredited as beyond the range of scientific possibility.

But if biotechnology has eroded prevailing judgments about military utility, what are the implications for the United States? Should the United States begin a major program in biological rearmament? Has the biotechnology revolution changed expectations about the Soviet non-use of biological weapons against the United States?

The revolution in technology has not changed our understanding of biological weapons as agents of mass destruction. An all-out Soviet first strike with biological weapons, even if employed in a non-traditional mode (such as the infection of U.S. military forces as a preliminary move to "soften-up" Western targets) would still likely precipitate a U.S. nuclear response. We should perhaps be more concerned today about two other scenarios. One is the Soviet use for tactical purposes of biological agents. The other is biological attack by non-state actors, such as terrorists. In neither case is the threat of U.S. nuclear retaliation particularly credible.

What if the biotechnology revolution results in weapons that are not massively destructive but still have military utility, i.e., biological weapons with tactical advantage such as instantaneous incapacitants? Clearly, the expectation (if founded) of facing such weapons should shape planning for the future battlefield environment; but it is difficult to envision how the possession of such weapons might add to NATO strategy in either retaliatory or first-use modes. It is also difficult to envision public support for the construction of such weapons, whatever their perceived military utility.

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[19] Testimony by then-Deputy Assistant Secretary of Defense for Negotiations Policy Douglas J. Feith to the Subcommittee on Oversight and Evaluation of the House Permanent Select Committee on Intelligence, August 8, 1986, 7.

The possibility--and partial evidence--that perceptions may be changing outside the United States about the military utility of biological weapons suggests that higher priority be given in the intelligence community to threat assessment. It also underscores the importance of an up-to-date understanding of the biotechnology of war so that biological agents can be identified and understood and innoculants devised in as timely a manner as possible.

Biological Arms Control

What are the implications of the biotechnology revolution for the biological arms control regime? In this instance, technological change has proven to be destabilizing. It has reopened questions in certain quarters about the military utility of biological and toxin weapons. It makes verification of noncompliance more difficult. It lowers the threshold for surreptitious breakout. It is likely to lead to the proliferation of such weapons and their use. The extreme view has been stated by the Defense Department official cited above, "The Biological Weapons Convention must be recognized as critically deficient and unfixable....The treaty has been overtaken by technology."[20]

This does not mean that the BWC should be cast aside as irrelevant to national and international security. The BWC is widely subscribed to and has dampened fears of biological proliferation and war. Furthermore, the document itself is not tied to a specific generation of technology. It can also be amended. The problem is not so much that the commitments undertaken by treaty signatories are somehow irrelevant today, as that the legal regime may come to be widely perceived as insufficient to contain treaty breakouts. The new challenge to the BWC is thus not so much new technology but an erosion of confidence in the utility of the BWC as an obstacle to the military application of that technology. This is both a technological and a political problem.

Confidence has eroded only in part because of technological change; it has also eroded because of compliance problems. Two types of compliance problems have undermined confidence in the arms control regime. One type of problem is posed by instances of indisputable treaty non-compliance--such as those cited by the Defense Department in the spring of 1988. The casting aside of existing commitments is likely to have an unsalutory ripple effect throughout the international community.

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[20] Feith, 9, 11.

A second type of problem is posed by instances of allegations of non-compliance. The debate about Yellow Rain is a case in point. Whatever one makes of the verity of the allegations by the U.S. government or its skeptics, by reopening questions about Soviet intent in the biological domain which have not been closed and by pointing to the possible creation of novel agents, the Yellow Rain episode created a sense of panic that the BWC had failed. The same can be said about the outbreak of anthrax in Sverdlovsk in the USSR in 1979, about which the Soviets have offered a belated if not wholly convincing account.[21] Whether the Soviets have cheated or not is of course crucial. But it is secondary to the argument here that disputes about treaty compliance that remain unresolved at the level of international public opinion undermine perceptions of the BWC as an effective agreement.

There is no easy way to make the BWC less imperfect. The addition of verification and compliance provisions, currently lacking from the treaty, would provide a more legally comprehensive framework but would be unlikely to be effective. A comprehensive inspection regime would be commercially intrusive, highly costly, and unlikely to satisfy its critics that it could deter or detect all militarily-significant cheating. As in the chemical domain, there appears to be no prospect of a breakthrough in remote satellite detectors. Some scientists have advocated an inspection regime based on such imperfect measures, arguing that it would be better than nothing; but such a regime might well have the unintended effect of weakening the BWC by consistently drawing attention to what cannot be inspected and known.

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[21] "Despite Soviet Account of Anthrax Outbreak, Questions Remain," The Washington Post, April 14, 1988, A26.

A pragmatic agenda to strengthen the BWC in the light of volatile technological and political circumstances should focus on two main items. The first is confidence building measures consistent with the original spirit of biological disarmament that civilian, peaceful applications of the biological sciences are a constructive endeavor while offensive military ones are not.

The BWC review conference of September 1986 pointed the way to tangible improvements in the regime, particularly in the greater openness of research.[22] Related measures such as bans on R&D for all military purposes and on troop training have obvious rhetorical appeal but are unlikely to contribute effectively to a more stable regime because they are either unverifiable or incredible.

The second item on the policy agenda should be finding a more effective way to resolve compliance disputes. The Sverdlovsk and Yellow Rain disputes demonstrate that in the absence of some established investigatory framework compliance questions escalate rapidly on the political agenda and come to be debated with less reference to the evidence and more reference to political predispositions. This is hardly constructive.

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[22] See the symposium on the "Second Review Conference of the Biological Weapons Convention" in Disarmament: A Periodic Review by the United Nations 10:1 (Winter 1986/1987), 43-72.

What is the place of the U.S. biological warfare research program in these priorities? What is desirable and permitted under the BWC? Such research by the United States has sparked considerable controversy within the scientific community as inconsistent with the U.S. commitment to biological disarmament. Civilian scientists have legitimately highlighted the thin line between offensive and defensive research while underscoring destabilizing potentialities.[23] But their arguments are sometimes carried to the extreme: "The notion of a biological warfare defense R&D program is a fundamental misrepresentation. The title of such a program implies that it is possible to defend one's civilian population from BW agents. In fact the only rationale for the development of a defense to a known agent is when one is planning to use that agent in an offensive mode."[24]

A contrary view has also been articulated. In its June 1985 report, the President's Chemical Warfare Review Commission concluded that

"the only sensible response [to the biotechnology revolution] is again for the United States not to ignore the problem, but rather

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[23] Susan Wright, "The Military and the New Biology," special issue of geneWATCH, a bulletin of the Committee for Responsible Genetics, 1985.

[24] Jonathan King, "The Threat and Fallacy of a Biological Arms Race," geneWATCH 2:2, 13-16.

> to conduct comprehensive defensive research on biological agents and toxins under conditions of extreme care. The need is to be able to assess the likely threat, to develop detection measures and defenses, and to create sufficient uncertainty in the minds of Soviet leaders as well as those of other governments that they would hesitate to trust in such a method of warfare. At this time, the Department of Defense does not have an adequate grasp of the biological warfare threat and has not been giving it sufficient attention. Both intelligence and research in this area, though improved after a virtual halt during the 1970s, are strikingly deficient."[25]

Such a program of defensive research can be defended as consistent with the purposes of the BWC--i.e., that the only way for a non-verifiable regime to survive changing technology is to provide for sustained investigation of that technology so as to limit the military incentives to breakout and surprise attack. But the policy community must ensure that all research conducted in the program is for strictly defensive purposes.

Conclusions

What does the foregoing analysis suggest in the way of conclusions?

First, to fully understand the import for arms control and national security of technological change one must look beyond how changes in the chemical and biological sciences have produced more potent poisons to the broad range of technical attributes pertaining to the development, testing, stockpiling, transport, weaponization, and use of such weapons, as well as relevant arms control verification technologies. An essential feature of technological change in these fields is that it has made derivative military capabilities more broadly accessible. Arms control cannot constrain the processes of international development that generate this expertise and access.

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[25] "Report of the Chemical Warfare Review Commission", 71.

Second, technological change is but one factor among many bearing on decisions in the policy and planning environment. We might speculate that a Soviet decision to maintain or augment its chemical and biological warfighting capabilities might be driven less by the advent of more potent systems than by improvement in NATO's conventional forces or by the deployment of a robust U.S. strategic deterrent. To look at the matter another way, technological change might make possible decisions justified on other grounds; some argue, for example, that the current Soviet interest in chemical disarmament may be sincere because their work on toxins and exotic biological agents has progressed so far as to render the chemical arsenal not only outdated but redundant.

Third, technological change and negotiated arms agreements are not incompatible. In the chemical area, technological change is not at the core of the arms control problem. In the biological area, recent technological changes have proven destabilizing but as yet not fatal to the arms control regime. Improvements in the technology of verification would help to strengthen the arms control regime, but no major breakthrough appears to be in the offing in the near- to mid-term. Verification and compliance remain politically volatile issues, vulnerable to a public debate prone to wishful thinking and double standards.

Fourth, even an imperfect arms control regime has some utility in constraining the actions of some actors and shaping the perceptions of others. If arms control is going to be an instrument of international security, it must account for our anarchic international system in which political factors and the struggle for power are major determinants of foreign policy behavior. Arms control--as regime and process--can be an effective tool for structuring incentives and shaping choices made by sovereign nations.

Fifth, the common tendency to debate the cbw problem in U.S.-Soviet terms narrows our understanding of the issues. To be sure, some aspects of the problem are rooted in the superpower competition. But other aspects shape the environment in which that competition proceeds. Yet other aspects are largely unrelated to the superpowers--particularly in the area of proliferation. Furthermore, solutions to the chemical and biological warfare problems and the achievement of a comprehensive, effective disarmament regime are beyond the unilateral reach of the United States. This is not, however, to say that the actions of the United States are without consequences.